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NEWSPAPER

MOS Memory, 200M-Byte Disk Highlight Univac 1100/20, 40

By Vic Farmer
Of the CW Staff

ROSEVILLE, Minn. – Out with plated wire and core memory, in with semiconductor memory – that's the core of Univac's modernization of its 1106 and 1110 CPUs.

The result is 1110/20 and 1110/40 CPUs that reflect the faster semiconductor memory speeds in faster throughput at a somewhat lower cost.

Univac also announced for the entire 1100 line a disk subsystem with a microprogrammed disk controller, the 5039, that is able to intermix both fixed-head and moving-head disk drives.

Four new drives provide the 1100 user with fixed-head drives (the 8405-00 and 8405-04) with capacities of 3.1M bytes and 6.2M bytes and access times of 8.3 msec, as well as IBM 3330-type disk pack drives (the 8430 and 8433) of 100M byte/spindle and 200M byte/spindle.

The disk units can be intermixed on one control unit in combinations of up to 16 8433 or 8430 units or eight 8433/8430 and eight 8405 units. The 5093 controller for the older 1100 CPUs, however, has a 1K word buffer to handle the slower CPU speed.

Communications Systems

Communications for the entire 1100 series can be handled by either a hard-wired lower-cost General Communications Subsystem (GCS) or an enhanced programmable Communications/Symbiont Processor (C/SP).

GCS allows up to 32 full- or half-duplex lines to be interfaced to the systems at speeds ranging from 45- to 50,000 bit/sec. The GCS allows selection of line speeds on an individual line basis, synchronous or asynchronous transmission and desired parity and character detection.

GCS is plug-compatible with the Communications Terminal Module Controller (CTMC) used with 1100 and 400 series computers, Univac added.

At the low end, GCS is about 25% to 40% less expensive than CTMC.

The enhanced C/SP contains semiconductor storage, an operator console, 8425 disk support, and Uniservo 16 tape support. Software improvements include disk staging, dynamic reconfiguration, binary synchronous support, audit trail and message switching, Univac said.

The operator console, consisting of a Univac DCT-500 keyboard/printer attached to the C/SP, allows users to input their programs and dynamically reconfigure their networks, Univac said.

The 1100/20 is available as a single processor, the 21, or as a dual processor, the 22. Likewise the 1100/40 is available as a single processor, 41; dual processor, 42; triple processor, 43; or quadruple processor, 44.

Basically a semiconductor memory version of the 1106, the 20 has been modified:

- Internal clock speed is up

(Continued on Page 3)

The Univac 1100/20 is basically a speeded-up 1106. The operator console includes a Uniscope 100 display terminal.

First DBMS for Minis

'Total' Coming for Varian V70

By Don Leavitt
Of the CW Staff

IRVINE, Calif. – The Total data base management system from Cincom Systems, Inc. of Cincinnati will be available in September to users of Varian's V70 series minicomputers under the Vortex II operating system, according to a joint announcement last week by the two vendors.

Total was originally developed for the IBM 360 environment. Since then, it has also been implemented on Honeywell, NCR and Univac mainframes and on the IBM System/3 as well [CW, Jan. 22].

Thus, with last week's announcement, a fully established data base management system (DBMS) has come to the minicomputer level, and thoughts that the small systems are inherently less useful than a mainframe for the average business-oriented user "seem to have been thrown in a cocked hat," in the view of one industry observer.

As on the larger machines, a DBMS on a mini serves as an interface between the user and his data. Total includes a full range of capabilities to create, maintain, modify or delete data sets independent of the user's application programs.

The form of the data and its physical storage media may be altered extensively without any impact on the existing application programs. The user calls for the data needed, and the system makes it available to him.

Supports Batch, On-Line Jobs

Total can be used in support of either batch jobs or on-line processing. On the Varian minis, it operates as a reentrant foreground task with Vortex II, and the user's programs may be in Dasmr (Varian's macro assembler) or, as with other Total versions, in Fortran IV, RPG-II, Basic or any other language that supports CALL statements.

A Total data base consists of a group of data sets or files of two types: master and variable. A master data set can be independent and the logical records in it can be accessed directly by respective control keys, Varian explained.

By contrast, a variable data set is dependent and must be attached to a master. The logical records in it are chained in

(Continued on Page 5)

Adapso Head Warns EFTS Needs 'Sound Guidelines'

By E. Drake Lundell Jr.
Of the CW Staff

NEW YORK – "Irreparable harm in areas other than technical performance can occur if we permit electronic funds transfer systems [EFTS] to grow without sound guidelines," according to Jerome L. Dreyer, executive vice-president of the Association of Data Processing Service Organizations (Adapso).

Guidelines are needed in the areas of "privacy, data banks, governmental regulation, integration of systems and creations of national networks," he told a luncheon audience at the Computer Caravan here last week.

Each of these matters "must be evolved maturely, or we most assuredly will create a bigger monster than the one EFTS has the real ability to solve," Dreyer said.

The technology to implement EFTS is presently available, he said, but added it "is like an iceberg. Its surface attacks administrative problems, while its subsurface characteristics can invade our total business systems as well as our moral code.

"It could be the finest blessing business ever had – or create a

(Continued on Page 4)

Multivendor Shops Still a Hit Despite Snags

By Patrick Ward
Of the CW Staff

NEWTON, Mass. – Four users who went to independent peripherals and third-party CPUs two or more years ago still favor multivendor shops, a *Computerworld* follow-up survey has found.

The four shops, all subjects of previous CW articles, have felt some bumps on their independent road. Two have upgraded from the IBM 360 systems they had earlier felt were most cost-effective for them. Two other users are holding on to the machines they had then and see no reason to change.

Perhaps the happiest user is Lynn McKinley, DP manager for Chrysler Corp.'s Airtemp Division in Dayton, Ohio. The division once had an IBM 370/155, but in early 1973 replaced it with a 360/65 with Itel 3330-equivalent disk drives [CW, Jan. 31, 1973].

Now, more than two years later, McKinley has bought the 360/65 and still uses it for financial jobs, payroll, inventory control and engineering applications.

"The 360 is just as flexible as a 370 and it seems to be a very reliable workhorse," he said.

And because of its good experience with Itel, the shop has brought in Memorex and Datapoint equipment and some independent modems, too, McKinley remarked.

Software for the 360 has "stabilized" and doesn't present a problem, he said. IBM and independent vendors jointly handle maintenance, and McKinley has not had problems there either.

University Had Problems

New Mexico State University, however, ran into both hardware and maintenance problems, the latter due in part to its isolated location.

In 1971, the university acquired a 256K IBM 360/65 with 2M bytes of Ampex Extended Core Memory, 12 Ampex disk spindles, two Ampex tape drives, three selector channels, two selector subchannels, a multiplexer channel and other gear.

This system cost 4% less than the shop's previous IBM 360/50 configuration but brought a 300% throughput gain, according to DP manager Mike Mann.

Two years later, the shop had to replace the Ampex tape drives due to "hardware bugs that just couldn't get straightened out," Mann said [CW, Jan. 31, 1973].

At the recommendation of another state school, the shop also tried out a Harris Cope 4705 front end, but "had some problems" and put in an IBM 3705 instead.

Though the shop added four more additional Ampex disk spindles to the original 12, it is now looking for more and is considering IBM 3330s.

"Our main problem is maintenance.

(Continued on Page 2)

★ CW Special Report on Stretching Your Hardware Dollars Follows Page 28 ★

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University Exorcising Terminals' Whine

By Nancy French
Of the CW Staff

COLUMBUS, Ohio – Ohio State University officials, who removed six ITT Asciscope terminals from the library only two days after they were installed, are testing various acoustical techniques to reduce the high-pitched whine emitted by the CRTs.

The Asciscope's whine was causing headaches and nausea in operators who had to use the terminals for a full shift [CW, March 12].

In an effort to ready at least one model for use in the library's very quiet telephone service center, Lynn L. Faulkner, associate professor of mechanical engineering, has been wrapping, blocking and sealing various machine parts to reduce the decibel level of four manufacturers' terminals.

The CRTs being tested include the Asciscope, the Hazeltine 1000, the Teltray 3700 and the Infoton Vistar/GT. To date, Faulkner said he has identified three sources of noise leakage and reduced the overall decibel level, which ranged to a high of 58 decibels, to about 20.

The three noise-generating components are a transformer, a solid-state device that works much like a diode and a small inductor, or coil, that makes up part of the power circuit, according to Faulkner. The noise produced by the offending parts is emitted through the keyboard and in some cases around the CRT screen, he said.

Faulkner has inserted acoustical foam, designed especially for noise reduction, and a loaded vinyl material, containing barium or iron ore combined with a heavy limp fiberglas mat, around the parts.

The same material has been placed under the keyboard, as well as around the CRT screen, sealing it tight, with no apparent heat retention problem, Faulkner said.

"None of the noisy parts were in an air-cooled area," Faulkner said. If that problem develops "we could always try a heat sink device – or metal conductor – to carry the heat away to a fan."

He also is investigating the use of a heavier gauge plastic for the CRT screens, he said.

So far, the terminals have only been tested in the sound lab, but library employees who have visited the test site agree the sound level is greatly improved, he said. "The next step is testing them in the library."

Not Much Vendor Help

Faulkner has not been overwhelmed with assistance from the vendors involved.

"Of the four, only Hazeltine's sales representative has been eager to cooperate," Faulkner said, attributing this to the fact "he's trying to get his foot in the door."

ITT's response was "they're already losing money on the contract and can't afford to help," Faulkner said. Rather than meeting the customer's needs, ITT agreed to let it out of the contract on the six Asciscopes intended for the quiet site.

"Vendors could help themselves by helping users solve problems," Faulkner pointed out.

"They should tell you not to put terminals back-to-back in a small room if they know the noise level will be too high" for people working in that configuration.

"They could have told us to put the terminals around the perimeter of the room with rubber mats under them and acoustical material on the walls behind them," he explained, "or they could have insulated them better in the first place."

Multivendor Shops Still a Hit

(Continued from Page 1)

It has to be either IBM or third-party maintenance because we're way out in the boonies," Mann commented.

The university plans to hold on to its 360 "at least until 1980," Mann said. VS holds little appeal for him.

However, VS was one reason Computer Research Co. in Chicago became an all-370 shop.

"I think, in the service bureau business, sometimes you bet against IBM and sometimes with them," said Jim Whitely, the current Computer Research president.

"We wanted the 370s because of the development work of people going to VS," he explained.

In 1973, Computer Research had replaced a 256K IBM 370/145 with a 512K 360/50 whose added core benefited the shop's remote job entry (RJE) customers.

The company also installed a 360/65 to back up its purchased 370/155. "It is possible to get equal throughput on the Model 65 and save $10,000/mo over a 370/155," said President Ron Ellis in January 1973.

Since then, Computer Research has replaced the 50 with two 135s. When the shop also installed a 158, the 155 became its backup and the 65 went out.

The shop is doing less 370 development work now than it once did, Whitely mentioned. People now are interested in doing their production work at as low a price as possible, he said.

Whitely, in fact, is thinking of bringing back a 360/50 for use as a batch DOS system running under the Grasp spooler from Software Design.

The shop still uses third-party lessors and has Control Data Corp. add-on memory and Storage Technology Corp. (STC) tape drives, Whitely said.

"Our multivendor relationship goes as smoothly as our relationship with IBM," he remarked.

Pacific Mutual Life Insurance Co. (PMLI) was a notable six-vendor computer center back in 1971. The shop felt it was saving the company $50,000- to $100,000/year in equipment rental this way [CW, Jan. 27, 1971].

PMLI leased its 512K 360/65 from Aerojet General – "it got caught in that aerospace crunch back then," explained Kenneth T. Garrison, PMLI's vice-president of systems and DP.

PMLI also had Telex tape drives for a while but has replaced them with STC units. The shop bought California Computer Products, Inc. (Calcomp) 3330-equivalents two or three years ago, Garrison noted.

The shop had also had Sanders 720 CRTs in 1971 but replaced them a year ago with IBM 3270s. The IBM units were price-competitive with the Sanders 720s, and the shop had had some trouble with Sanders maintenance, Garrison said.

The shop now has 36 on-line CRTs and is a lot more dependent on them than it was a few years ago, Garrison observed.

PMLI exchanged its 65 for a 155 when the DP center was moving to another building and decided to evaluate its long-range needs.

"We felt we would be better off with a purchased machine," Garrison said. The shop was also converting from DOS to OS, and "we needed the 370's DOS emulator to act as a bridge to OS," he added.

On the Inside This Week

Latest Univac 1100 Releases Have Semiconductor Memories

(Continued from Page 1)

from 167 nsec to 125 nsec.

- Direct addressing is expanded from 256K words to 512K words.
- Use of 1110 console is standard.
- Parity checking is through the channel.
- Semiconductor access time is about half of core times – 875 nsec vs. 1.5 µsec.
- Memory control logs 1-bit errors to pinpoint faulty memory circuits for replacement.
- Memory increments are available in 64K-word or 128K-word blocks up to 512K words (36-bits).

In addition, up to 16 I/O channels can be added to the 20.

The 40 processor, basically an upgraded 1110, has a bipolar primary memory instead of the older plated-wire memory and this gives a 280 nsec read/380 nsec write speed as opposed to the older 320 nsec read/520 nsec write speed. Up to 512K words of primary memory can be attached and, in addition, up to 1.5M words of the same MOS memory used on the 20 can be used as secondary memory.

With the 40, also, the direct addressing capability has been upped to 512K words.

Univac explained it would have liked to make the older 1106s and 1110s field-upgradable, but the 6000 wire changes made this impossible.

Monthly rentals (including maintenance) on a one-year contract begin at about $25,000 for a basic 1100/20 system and range upward to $250,000 for a large 1100/40. Comparable purchase prices would be $1.2 million for the 1100/20 and up to $12 million for an 1100/40.

First customer deliveries are planned in July for the 1100/20 and in August for the 1100/40.

CPU	KOPS*	PRICE** (MILLIONS)
370/145	300	.895
1100/21	900	.700
1100/22	960	1.430
1100/41	850-1100	1.880
370/158	1000	1.900
1100/42	1500-2100	2.910
1100/44	2800-3500	3.890
370/168	3800	3.430

*Kops = Thousands of operation/sec.
**Price includes CPU, memory, console.

Univac compares its newest Univac CPUs to members of the IBM 370 line in this table. The Univac 1100/20 is basically a speeded up 1106.

SYSTEM	KOPS*	SYSTEM	KOPS	$ Δ	K Δ
1106 I	390	1100/21	600	15%	54%
1106 II	525	1100/21	900	–30%	14%
1106 IIMP	800	1100/22	960	–40%	20%
1110 1X to 4X	350 to 2700	1100/41 to 44	850 to 3500	12% to 22%	140% to 29%

*Kops = Thousands of operation/sec.

This is a comparison of the 1106 and 1110 with the 1100/20 and 1100/40 from Univac-provided data.

No DP Skill Needed To Use Univac's RPS

ROSEVILLE, Minn. – Advances in software support for all Univac 1100 series computer systems, including the newly announced 1100/40 and 1100/20, are Remote Processing System 1100 (RPS-1100); Quota, for increased control of computer usage; an improved Terminal Security System (TSS); and Query Language Processor 1100 (QLP-1100).

RPS-1100 is a general-purpose data management and file processing system for users accessing a data base through a Uniscope 100 or 200 remote terminal. It can, according to Univac, be easily utilized by plant managers, expediters, foremen and others to interactively develop and use their own applications.

New users may be guided through system functions in a tutorial manner, assisted by a format on the display. RPS-1100 provides a reinforcing response to each entry and shows the options at each step.

The system provides a unique capability to easily construct display-oriented applications sequences on-line with three-structured decision points, Univac said.

Quota allows the 1100 site administrator to control system resources by generating the tables and Executive System software element through use of the input language processor and controlling such resources as standard units of accounting, maximum run priority, maximum cards read or pages printed, Univac said.

Quota provides control by time of day, type of run, system features, components, forms, mass storage or other parameters. The administrator may thus define and enforce limits for demand users, at the account number or password level, ensuring that no single user can preempt the entire system, the vendor said.

The TSS assures the validity of users through passwords and other means, according to Univac. Its primary purpose is to allow the site manager to create and update his own security system environment.

TSS also serves as an interactive processor allowing the user to control and modify limited portions of this security.

QLP-1100 permits the user to interact, in either a demand or batch mode, with a Data Management System 1100 data base. The command repertoire and language syntax allow communications with the QLP processor via English-type statements, reducing learning time.

QLP-1100 includes two major components: a Query Processor, which analyzes queries, accesses the data base and returns results; and a Subschema Data Description Language Processor, which analyzes the data base specification and produces the required tables.

Adapso Head Warns EFTS Needs Limits

(Continued from Page 1)

system that would make even George Orwell blush," he declared.

Noting the huge volume of checks within the banking system, Dreyer said EFTS "can establish better standards to cope with other administrative challenges."

But he warned that, "in the name of improved management," EFTS could also "completely alter our lives" because it could "introduce concentrations of new power blocks."

To prevent these problems from developing before they are completely studied, Dreyer supported measures in Congress that would call for a two-year moratorium on the development of EFTS until recommendations on their implementation can be developed.

One of the problems is that of concentration, where a few large banks would dominate the entire EFTS market, he said, adding that "EFTS dominated by a few institutions presents a potential danger."

Therefore "all financial institutions should have access to EFTS facilities."

But, he warned, "if EFTS is to join banks, clearinghouses, retailers and other commercial organizations in a nationwide – and perhaps ultimately worldwide – integrated economic structure, conscious and aggressive effort will be required to prevent serious anticompetitive effects."

Anticompetitive Effects

There are possible anticompetitive effects, he said. "The proposed economic links between presently independent economic units could introduce structural rigidity into the national economy.

"Measures are required to guard against such an effect through the introduction of lawfully promulgated standards permitting rapid and easy coupling and uncoupling between units in and out" of EFTS networks, Dreyer stated.

Next, Dreyer said, steps must be taken to prevent the EFTS network from being so interdependent that a failure in one part of the system could bring down the whole system, much as the failure of one component in the electric supply system brought down the whole East Coast in the great blackout of 1965.

Privacy is an important concern, he indicated, but he expressed deep concern over "the growing tendency of government and society to evaluate the social impact of complex computer technology on the basis of inadequate and often simplistic considerations."

To overcome this, he suggested all data banks be required to file privacy impact statements and "the operation of mass data banks should be determined upon a fair balancing of all the benefits of operations against all the detriments.

Firm's 360 Upgrade Fits Budget Better Than 370

By Patrick Ward
Of the CW Staff

NEW YORK — Bargain basement-priced IBM 360s could be just the answer for DP shops with shrinking budgets, according to a user who decided to upgrade to a 360/65 rather than a 370/145 last year.

"We found the market for 360s to be so favorable . . . that, from a dollar standpoint alone, justification of a 370 was nearly impossible," Dennis Muenzer, director of management information systems (MIS) for the Ideal Toy Co. of Hollis, N.Y., told Computer Caravan attendees here last week.

For example, the firm discovered that a 360/65 compares favorably with a 370/145 in terms of throughput at about 22% of the cost, he said. Similarly, a 360/40 can be likened to a 370/135 at 20% of the cost, and a 360/65 to a 370/155 at 40% of the cost.

Muenzer's own firm had a 128K 360/40 when it decided to upgrade. The firm's studies showed that a 370/135 "was only marginally better than a 360/40, and what we really needed was a 145," Muenzer said.

But the 145 would have leased at $13,000- to $15,000/mo without peripherals, compared to the $6,000/mo cost of the 360/40.

The firm finally opted for a 360/65 "which we felt would give us sufficient power for about five years," the MIS director said.

Ideal Toy now has the 360/65; double-density Control Data Corp. disk drives; tapes, CRTs and I/O gear from IBM; a Xerox Corp. 1200 printer; and the Grasp spooler from Software Design — for a total of about $20,000/mo, Muenzer said. A 370/145 with comparable peripherals would have cost the firm double that amount, he added.

Muenzer compared shopping for a used computer to going out and buying a car. "It's amazing to see the spread in rates from one leasing company to another or from one broker to another," he said. Like car dealers, prices depend on the equipment "they are holding at the time or how hungry they are."

After locating the right used computer, the next problem is financing it, and Muenzer discussed leasing plans.

In a "full-payout lease," the lessor "assumes absolutely no risk of obsolescense and is, in reality, simply making a loan for the purchase of the equipment," Muenzer said. However, title frequently remains with the lessor at the end of the lease payment period. Users must specify in their negotiations what they want in the end, he advised.

The "nonpayout or operating lease" generally runs from two to five years with monthly charges of 10% to 20% under manufacturer's rental.

The rates charged depend primarily on the length of the lease term, the cost of the equipment and the residual value anticipated by the leasing company at the end of the lease term.

Independent Peripherals

Independent peripherals are another way DP shops can save money.

Users should check out the financial stability of the peripheral vendors they might be dealing with, he said. Users should also find out where the vendor's nearest customer engineer is based, the number of accounts he handles and his backup.

It may be difficult, "but get the vendor to guarantee response times to a call in writing," the MIS director stated.

The user may also have to deal with the IBM sales team and the "strong possibility that it will attempt to reach around you and go directly to top management to convince them to stay with IBM." The best defense against that is doing your homework, anticipating counter arguments and showing your facts and figures to management, Muenzer advised.

Probably the biggest cloud over independent peripheral use is divided-maintenance responsibility, he said.

Ideal Toy's tactic is to insert the following clause into its contracts:

"In the event of malfunction which manufacturer is unable to rectify within 48 hours, customer may cancel this agreement in its entirety without additional charge . . . Malfunction of equipment supplied by another vendor caused by manufacturer's equipment or which manufacturer cannot establish is not caused by manufacturer's equipment, within 48 hours, is included."

The threat of invoking this starts "a beehive of activity which manages to get the problem solved quickly," Muenzer said.

Users should also put delivery dates into their contracts with delays tied to either penalties or the option of cancellation. The user might also want provision for his own delay in case his site is not ready.

'Total' DBMS Put On Varian V70 Minis

(Continued from Page 1)

groups and each group, in turn, is chained to a specific master record in a master data set. The chaining provides the access paths, both down from masters and up from variable records, creating a network-style data base system.

Total provides both a Data Base Definition Language (DBDL) to create the base and its linkages and a Data Management Language (DML) to access and manipulate the base once it is in place. These elements of Total would normally be under control of a data base administrator function which operates apart from, but in conjunction with, the application programming staff, Cincom noted.

Diagnostic messages are provided to aid debugging in the course of preparing data bases and application programs. Multi-level logical definition of data elements with a data record is permissible, and a data element at any level may be independently addressed, the vendors noted.

Minimum configuration for use of Total is a V70 series CPU with at least 64K words or 128K bytes of main memory, the memory map option, 512 words of writable control store, a priority interrupt module, a teletypewriter or compatible CRT terminal, sufficient disk or drum storage for the user's data base and a card reader, paper tape or magnetic tape I/O subsystem.

If Fortran IV is to be run concurrently with Total, a second 512-word writable control store will be needed, Varian noted.

The Total software will be available in September for $9,500.

The Total-Varian linkup is the first DBMS-mini combination, but clearly it won't be the last. Indications abound — both implicit and explicit — that other software systems and other vendors' minis will be tied together, probably by year's end.

Funds 'Misassigned'

Faulty Input Snarls City Audit Process

By Edith Holmes
Of the CW Staff

PORTLAND, Ore. – Inaccurate input into a computerized accounting system here forced certified accountants to withhold approval of the city's annual audit and city officials to ask the state for a three-month delay in completing their financial reports.

In checking over the reports generated by the system, "we found not that transactions were missing, but that they had been miscoded and entered under the wrong accounts," Charles Spear, chief deputy to the city auditor, said. "The monies weren't missing, but they had been misassigned."

Installed a little over one year ago, the city's Fiscal Management System (FMS) was developed by outside consultants to run on an IBM 370/155 owned jointly by the city and neighboring Multnomah County, he explained.

Although the system's batch programs are currently both operational and accurate, they did not produce correct records during several months of the fiscal year ending last June and three months of the current fiscal year, Spear added. As a result, city officials have had to go back through informal, written accounting records kept during the transition to the computerized system and manually balance the funds.

In general, Spear attributed the problem to "bad judgment and inadequate planning for the system" on the part of city officials.

"We had unrealistic target dates for the conversion from our manual system to FMS, and we failed to provide a parallel system to act as a check on the new system until its results had been approved," Spear explained.

He specifically pinpointed the problem at the entry of original data. "There were sufficient errors here to cause the independent auditors to withhold their approval of our accounts," he said.

Ed Prichard, director of the Data Processing Authority (DPA) which serves the city and the county, agreed that most of the system's difficulties stemmed from poor data input. "Problems resulted from operational rather than computing errors," he remarked.

County's Records Accepted

The county's experience with the system would seem to support Prichard's and Spear's evaluation of the problem. Unlike the city's records, Multnomah County's audit was accepted by outside auditors; they did not find the 5% error rate in transactions processed as was the case with the Portland audit, Andy Thaler, county controller, said.

While city and county use the same method of inputting data, the county centralizes these efforts, Thaler noted. In contrast, the city has decentralized its DP operation, coding and inputting source documents into the financial system at various locations throughout Portland.

Ken Hammon, financial officer for the city, commented that "the training of the people in the coding department left something to be desired." The financial department's staff is now conducting training in coding throughout the city and "we do see improvements in performance," he said.

Several manual controls have also been built into the city's approach to the system to "assure that the manual records reflect the same information contained in the automated system," he added.

Like Spear, both Hammon and Thaler traced initial problems with the system to the circumstances surrounding its acquisition. To some extent, Hammon blamed the DPA for its inability to write the programs for the financial package as they were conceptualized by consultants.

Thaler, on the other hand, emphasized the sketchy documentation the DPA received from outside sources.

It didn't help that the system consists of elements designed by three different consultants, Thaler added. FMS includes a general ledger and budget packages tailored for the city and county by Booz-Allen and an off-the-shelf payroll package from Computer Sciences Corp.; most of the difficulties experienced seem to lie with the general ledger module, he said.

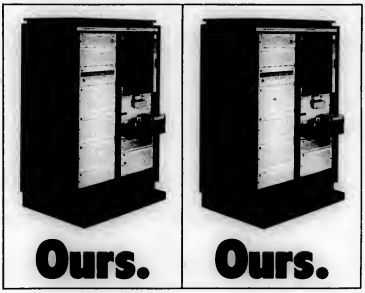
But Thaler noted the input system on the general ledger and budget programs was put together by consultants from Arthur Young who were dismissed before the job was completed.

And while Booz-Allen completed the output requirements for the package, he added it "packed its bags and left before adequately documenting its work because it was running out of money and wasn't to receive additional funds."

Whatever the actual source or sources of the system's trouble – input errors, the DPA's lack of experience, the quality of work done by the outside consultants – FMS is up and running, efforts are underway to minimize input errors and, with a few adjustments during the next few months, the city expects a favorable response from its auditors this fiscal year.

Ironically, much of the push behind the rush to design and install FMS stemmed from anticipation of a merger of city and county government – a proposal defeated by the voters at the polls last May, city officials said.

The new V-75 leaves us competing against ourselves.



When Varian introduces a new computer, you can be sure it beats everything around. Which really ups the industry ante.

Fully compatible with previous V-70 computers, the V-75's new capabilities make it the most powerful member of the high performance V-70 family.

The CPU's instruction set is a significant expansion of previous V-70 computers. New instructions operate on 8 general purpose registers and handle 8-, 16- and 32-bit operands. Plus, up to 512K bytes of 330 nanosecond memory which is directly accessible via 1024 mapping and protection registers. And I/O transfers at up to 3 million 32-bit words per second are possible through dual memory buses.

The V-75 widens the competitive gap even further with the Writable Control Store package. New firmware modules include byte and stack manipulation and accelerated FORTRAN functions.

The new, fast FORTRAN included in the V-75 package is comparable to large machine compilers. With double precision integer data, compiler overlays, seven dimensional arrays, and direct access I/O.

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Write Varian Data Machines, 2722 Michelson Drive, Irvine, California 92664. Or call (714) 833-2400.

varian data machines

Progress Report:

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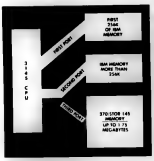

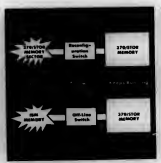

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Only 370/STOR lets IBM 3145 users add any amount of memory — up to two megabytes — on top of *any amount* of resident IBM memory — with complete transparency and no CPU tampering. Our third port shares IBM's second memory channel with resident IBM memory, so you can add low-cost Cambridge memory very simply, regardless of how much IBM storage you have. And it works so well, even IBM approved it.

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370/STOR 145 detects and corrects all single-bit errors, and detects multi-bit errors. So do other 145 memories. So to be different we add a reconfiguration switch to let you dial out failed 370/STOR memory, *plus* an off-line switch to dial out failed IBM memory. Either way, you keep running.

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DPMA President Urges Societies To Help Develop Privacy Laws

By Catherine Arnst
Of the CW Staff

BOSTON – Professional associations have been "dragging their feet" in the area of privacy legislation, according to Edward Palmer, international president of the Data Processing Management Association (DPMA).

"The result could be laws which are harmful and restrictive," as well as causing an incautious rush to licensing, he added.

A combination of good privacy legislation and stronger professional societies could eliminate the need for licensing, however, Palmer noted.

"If it's needed, let's develop an adequate licensing law. Legislators should be a little more careful than they have been in legislating for other professions; let's learn from their mistakes."

To safeguard against a situation where "we will repent at leisure," Palmer suggested associations must work closely with legislators to develop "universally effective laws."

"Everyone is rushing to develop his own privacy laws, resulting in some slipshod legislation. For example, the state of Washington recently passed a law which contains the name of Montana in it, it's so closely copied," he said.

"I don't even see the need for individual state laws," he added.

DPMA hasn't participated in these issues as an association enough in the past, he said, and "unless we move faster we'll be left behind." The organization is now working with the American Federation of Information Processing Societies (Afips) to assist lawmakers in drawing up privacy legislation.

Legislation Not Enough

But legislation in itself isn't enough; associations must play a stronger role, Palmer said.

DPMA adopted a standard of "ethical professional" conduct in the area of privacy in data banks last April [CW, April 10], for example, which stated its members have a responsibility to continuously "strive to honor the rights of all individuals." Members should also work to maintain confidentiality of any data entrusted to their care, refrain from using confidential information to further their own personal interests and remove any misleading or inaccurate data from the system, according to the standard.

At that time, DPMA proposed no penalties for violations of these ethics, but Palmer contended now is the time to take such action. Penalties, he suggested, would include revoking the Certificate in Data Processing (CDP), expulsion from the association and restriction from any other society. He also wants to "tighten up membership screening."

At present, "such penalties would not carry much weight, since DPMA's effectiveness is limited," he said. He hopes DPMA, with a membership of about

Edward Palmer

23,000, will start to increase its influence within the industry.

"We're trying to strengthen ourselves so the need for government regulations will be minimized. DPMA is currently considered a middle-management group. People enter at the lower levels of management, and when they move up to higher levels they drop out. There aren't many top-management people in our membership," he said.

Trying to Change

"We're not doing things that appeal to members, and we're now trying to find ways to change this," he added. "I hope eventually professional societies could become to the computer industry what the American Medical Association is to medicine."

The first step toward this end was to put the CDP under the aegis of the Institute of Certified Computer Professionals (ICCP), Palmer said, where he hopes it can reach the whole span of computer professionals. "It was a wise move. ICCP is a beginning – a building block for more and better tests."

"The CDP exam is still viable, although there is a tremendous need for expansion. It was given to ICCP for that reason, so they could develop a broader base," he said.

Controls Essential

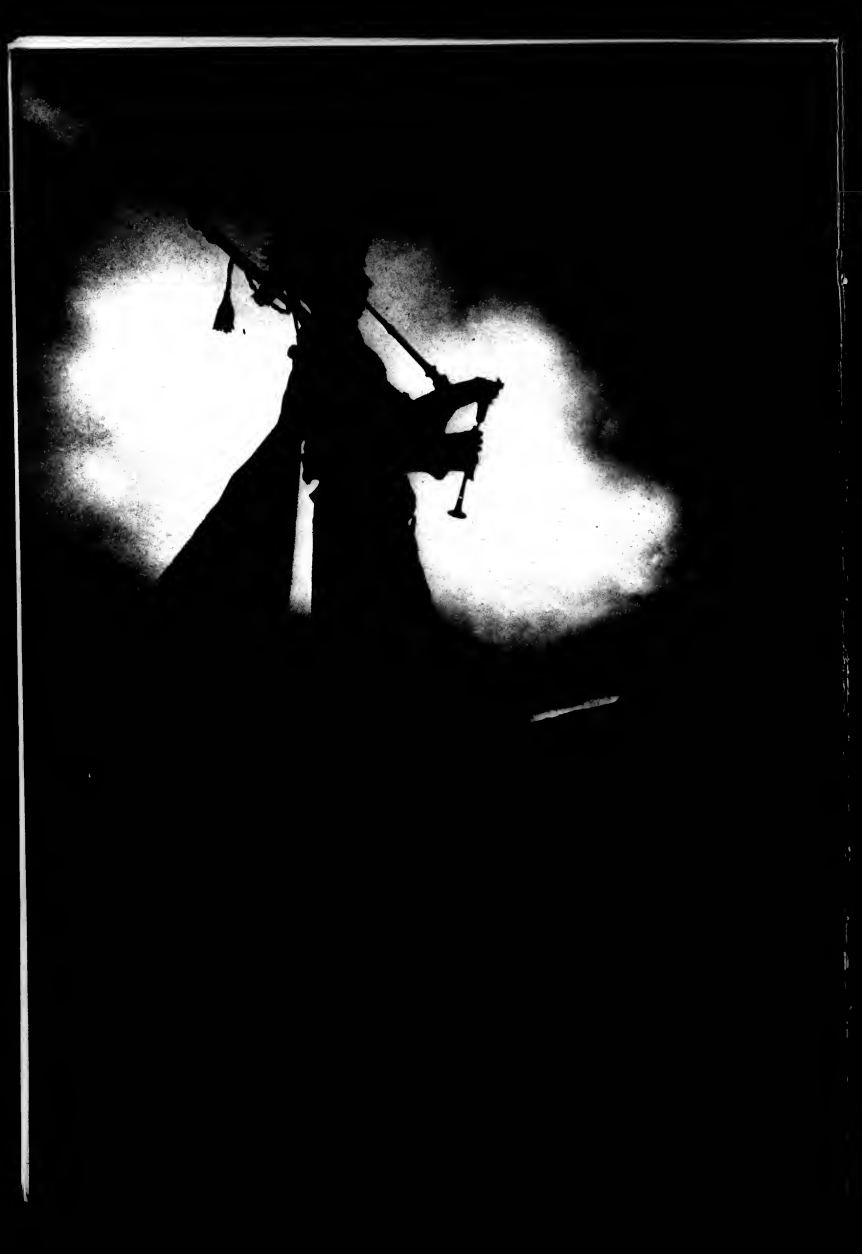
Controls on the flow of information are essential, no matter what, he added. "By the year 2000, information as a product will be a major portion of the gross national product," he predicted.

"I see a time when large computers will become public utilities, sort of quasi government. Minicomputers will forestall this for a while."

Problems with such a large data bank would be numerous, Palmer asserted, but he anticipates hardware and software lockups could be built into such a system.

"I'm confident we can eventually build a virtually foolproof system," he said.

Palmer passed the CDP exam in 1965 and served as a member on the Board of Certification in 1971. In addition to his duties with the DPMA; Palmer is assistant to the director of administrative DP at Boston University.



Announcing a new challenger from the clan!

Meet [illegible] Data Module, available in 45 [illegible] cartridges. It's a born competitor, [illegible] specifically for use with the IBM [illegible] System/34 and /36. Like the modules on it's [illegible] pre-initialized. Unlike [illegible] shipboard protection and [illegible] important thing [illegible] one of the world's [illegible] data recording [illegible]. Proven. Dependable. And [illegible]

Call out the clan!

3M

Editorials

Too Young

Proponents of licensing argue that, through this mechanism, DP can dishonor those of its practitioners who act in unethical ways, legally prevent them from practicing the trade and hopefully keep them from harming people and organizations served by DP.

But before members of a profession have the license to "dishonor" anyone, they had better be certain the profession itself is above reproach.

Groups concerned with the ethical responsiveness of DP practitioners might better concentrate their efforts on ways of improving throughput and diagnostics, performance measurement, documentation, data security, management of the DP function and communication between those who use computer systems and those who control them.

At best, licensing should be an outgrowth of development in these areas. And, if the demands of concerns like documentation and data security are really satisfied, licensing may not be necessary at all.

How can DP practitioners go about developing their profession? Perhaps one of the best ways is to encourage both industry and universities to spend more time, money and cooperation on training those who plan to work and those who are employed in the field.

Ethics are taught, and they can be learned. By fully developing the capabilities of its practitioners through education in schools and on the job, DP may find it has to worry less about the ethical behavior of its members.

There may come a time when data processors should be licensed; but, at the very least, licensing should wait until DP comes of age.

More to the Story

The user community should be properly underwhelmed by the official IBM edict that "Future Systems" (FS) is now a nonterm in the IBM dictionary of code names. That is almost like General Motors telling us the 1980 Chevy will definitely not be known as a Ford.

But there is more to the story.

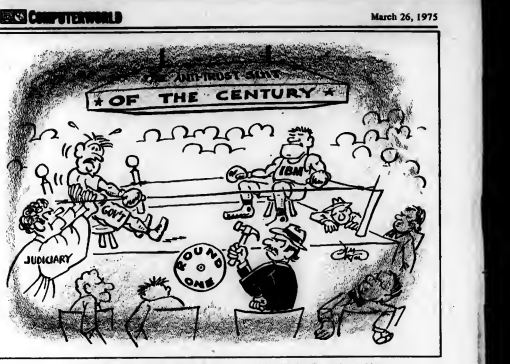
The IBM statement was described as a response to published reports that were interpreted by the company as having negative financial implications. That may have been part of the reason, but IBM officials have recently admitted 370 shipments to users will be down this year.

Users may have been adopting a wait-and-see attitude to evaluate what FS would look like in the late '70s. In that context, the IBM death knell for FS might be an attempt to reassure potential customers the 370 will be around for years to come.

Nevertheless, there is reason to believe the industry giant has altered its development of new systems. The term "FS" was actually dead for some time. The internal IBM project name was reportedly the "Graduate," and various subprojects were said to have been named for small colleges near Poughkeepsie, N.Y.

There is now evidence the Graduate is being disbanded. And experts point out resurrection of a similar team would take at least two years. The net effect to users is at least a two-year postponement of an FS-type system.

All this probably points to an interim family of processors somewhat beyond the present 370s but not quite up to FS or Graduate specifications.



'Let's Wait a Couple More Months — Why Wake Everybody?'

Letters to the Editor

Taking Sabbaticals in industry Brings New Views of the 'Outside'

Computerworld has recently had a variety of articles dealing with the failings of computer science departments in addressing the business world's computing needs. There have been some rays of hope, such as the February 26 article on Harvard and Pennsylvania's new programs, and in the same issue, W.P. Davenport's letter suggesting industry support its technically strong employees with sabbatical leaves to teaching positions.

I would like to point out another possibility — the support by industry of instructors taking sabbaticals *from* teaching. I have had such a valuable experience, one that gave me new views of the "outside" and hopefully also contributed to the betterment of my temporary employer.

Many companies spend large sums on consulting each year, some of which might be channeled to support of professors on sabbatical leave. The employer, the professor and the student will all benefit from such a program.

T.L. Yates

Oregon State University
Corvallis, Ore.

Panels of 'Leading-Edge' Users Could Cut Down on Questionnaires

All of us here at M&R Services, Inc. enjoyed "Old Memories Often Bias New Package Selection" [CW, Feb. 26]. The one package in Indiana Insurance Co.'s library that Joe Nugent described as having been brought in by a company actuary "from 'somewhere'," implemented and "it's been running every since" was supplied to Indiana by our firm in September 1973.

It was actually three integrated but separate systems — Model Generstor, Life Gasp Reserves and Model Valuation — which are designed to assist an actuary in valuing the profitability of an insurance plan or group of plans.

We, too, use outside systems. The kind of outside package we consider obtaining is usually related to a specific need which can be solved by the given package at a reasonable price.

More often than not a company can save money by obtaining an outside package and not reinventing the wheel in an area in which they may not have expertise.

Rick Fuller

M&R Services, Inc.
Seattle, Wash.

Vendor of Actuarial Tool Finds Outside Packages Valuable Too

The March 12 editorial on computer-user surveys made a valid and important point. The statistical validity of responses from random surveys is distressingly low, and product decisions made on the basis of these surveys may miss the mark completely.

Our organization has undertaken more than 20 surveys of computer equipment and service users during the past four years for incorporation into published reports. We began to notice falling response rates to questionnaires in mid-1973, indicating users were becoming overburdened with surveys from manufacturers, market research firms, etc.

In 1974 we switched most of our survey effort away from random questionnaire mailings and concentrated upon small "panels" of leading-edge users whose attitudes and budget plans were generally indicative of the user population at large. By this means, we have been able to obtain statistically valid survey results from small samples — and without bothering thousands of users!

Kenneth G. Bosomworth
President

International Resource Development, Inc.
New Canaan, Conn.

New Point of View Means Grosch's Law Needs Revision

Fred Littrell's letter to the editor [CW, March 5] really rattled my cage. That's the first time I've heard Herb Grosch labeled *pro*-IBM. But, upon reflection, maybe it's true.

For 25 years IBM has been thriving on Grosch's Law. It has been very successful promoting centralized computer systems as cost-effective. The centralization of the operating system software, with its resulting complexity, results in a high degree of customer dependence on IBM.

Now comes this minicomputer thing which threatens Grosch's Law. It's not easy to change such a basic orientation, but I'm convinced this change is now in process.

With such highly respected industry figures as Capt. Grace Hopper proposing networks of minicomputers, a change in DP system philosophy is inevitable.

Still, I can't really picture Grosch as pro-IBM, even though Grosch's Law put him in the same philosophical bed with it. Hopefully, he'll come around to the new point of view soon and give us Grosch's New Law for the evolution of distributed DP systems.

Don Berteau

Oak Park, Ill.

Definition, Please

I would like to ask Kenniston W. Lord Jr. what a kudo is [CW, March 12].

Is it like a patho or a cosmo?

S.E. Wright

Princeton, N.J.

(Other letters on Page 14.)

Eyeball Pollution

One of the few vigorous direct actions I was able to take while director of the Center for Computer Sciences and Technology at the National Bureau of Standards (NBS) was to trample around on a venerable optical character recognition font called OCR-A.

When I arrived on the scene at NBS, action was underway in the appropriate American National Standards Institute (Ansi) committee to define a lower-case alphabet, promote the use of the upper case already defined and extend the already wide use of the numerical set. The latter was already widely used on raised-numeral credit cards; one easy way to recognize it is to look at the eight, which has a small squarish upper loop perched on top of a good deal larger but similar lower loop.

Overseas standards institutes had defined a complete (numeric, upper-case, lower-case) font called OCR-B and solicited my support in holding the Ansi group to a prior commitment to examine the European offering.

It was abundantly clear that with the advent of large-scale-integration integrated circuits, the cost of discrimination logic in an OCR machine, as compared with the cost of frame, power supply, paper handling and optics, would be negligible. True, existing numerical scanners did not then have LSI chip technology. But clearly it was coming and could read virtually anything from Bodoni Bold to blackletter reliably.

Now, OCR-A is a distorted and ugly set. The proposed lower case was much prettier – which only proved that *future* scanners could read attractive fonts. The combination of reasonably nice lower case, ugly upper case and atrocious numerals and symbols was exceptionally unattractive and awkward. Control Data for some years typed much of its regular correspondence on machines (IBM??) using the mixture, and it literally hurt one's eyes to read CDC letters.

So I jumped up and down and hollered, "Eyeball pollution!" I said that millions of innocent housewife-type consumers should not have to strain their eyes, gnash their teeth and write erroneous checks because turnaround documents such as utility bills were printed in OCR-A.

I had some effect. Not much – but the strong CDC thrust was somewhat blunted, and OCR-B became more familiar and more available. IBM made up appropriate golf balls. The years went by; LSI is a reality. The OCR people can read just about anything, although "oh" and "zero" and such still obtrude. Yet, after all the hassle, we now have divergent standards again: one branch of the retail trade has opted for ugly, clumsy A, while another (the grocery boys) has chosen B.

Somebody back at the ranch is presumably sweating out a warehouse full of old technology. And 50 million consumers in this county alone will have to suffer, perhaps for decades. As I said in a recent column, "Evil never sleeps!"

The National Retail Merchants Association should rethink the decision. It is technologically unnecessary. It is anticonsumer. And, in a world so often ugly and brutal, our trade and its customers should opt for pleasantness and good looks.

Herb Grosch

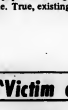
Consumer 'Victim of Illogical Logic'

Utility Bills Confusing to All But Weathered DPers

One of the perennial complaints about computers concerns electricity and gas bills. Typically, these bills are difficult to understand, involve fairly small sums of money and are addressed to the general public, rather than to experts who know the system inside out.

Also typically, the utility billing problem, unlike the telephone billing problem, rarely involves complaints of inaccuracy. The problem is the bills' method of presentation, which is confusing.

The Taylor Report
By
Alan Taylor, CDP



R. Montgomery of Bridgeport, Conn., recently sent me a copy of his bill from the Southern Connecticut Gas Company, which is reproduced at the right. Montgomery wrote: "I always enjoy your candid criticisms on consumer billing practices. I have enclosed for your review and, hopefully, entertainment, a utility bill I receive monthly from my local gas company.

"My extensive background in DP enabled me to unscramble the contents and validate its accuracy. However, I can't help but feel that the unwary consumer remains a victim of illogical logic."

He has a point. Close examination of the bill shows it is intended to be a bill for $36.05 for gas used in January 1975. As Montgomery uses the "Equal Pay" plan and is up-to-date in his payments, he is being asked to pay only $29. That's the guts of the bill.

The data, however, does not show any difference between new items and subtotals (underlining is too convenient for computers?). In addition, there are no fewer than four sets of calculations with details of some inserted into the single column of figures.

Separated, the four supporting sets of calculations are:

- Opening cash balance. This has three figures printed: previous balance, payments and balance forward. In this case, the calculation of $29 minus $9.78 easily and correctly shows an opening balance of $19.22 credit.
- Current gas charge. This is shown only as a result, $36.05 in the "explanation" and "amount" columns. Backing up the result are the meter readings, the amount of gas calculated to be used (12,200 cubic feet) and the identity of the rate concerned (1C).

Missing from the face or back of the bill is any way of calculating the dollar amount from the amount of gas used.

- Purchased gas adjustment. A cryptic note at the bottom of the bill says $1.18 CR was deducted from the current charge because of this adjustment. Again, no way of working this out is shown – and now it looks as though the real charge for 12,200 cubic feet of gas at the 1C rate won't be $36.05, but may be $37.23.
- Closing cash balance. The bill starts with a "previous balance" of $9.78. After taking into account new charges and payments, it states a new balance forward of $16.83. However, this is not labeled "balance forward" although it will appear as "previous balance" on the next bill.

Instead, it is labeled "total this bill," which isn't correct. The bill total is either $36.05 or $29, depending on whether the document is primarily a bill for January's gas or one for the February Equal Pay plan amount.

These four calculations – opening cash balance, current gas charge, purchased gas charge and closing cash balance – are the real cause of the confusion. The failure of the gas company to provide complete information or to correctly label the various figures increases the confusion.

Another Offender

Another apparent offender is the New England utility company which sells electricity. In a flyer given out at the New England Home Show in Boston on March 2, the Boston Edison Co. told consumers: "Your electric bill isn't as confusing as it seems. It's just that computers make it seem that way."

Boston Edison then gave what it called an "easy way" to check electric bills. It involves:

- Finding out what the Boston Edison "rate" is.
- Doubling or halving the rate figures to match Edison's billing practices.
- Applying a series of different rates $1.94 for the first 15 kilowatt hours (KWH), 5.6 cents for the next 35, 4.3 cents for the next 100, 3.5 cents for the next 100, 3.2 for the next 300 and 2.9 cents for the last 200.
- Multiplying the total KWH for the given six-digit fuel-adjustment charge.

Of course, none of this is on the bill, but then that's just the way computers make bills seem confusing, Boston Edison said.

What do you say about it?

THE SOUTHERN CONNECTICUT GAS COMPANY

METER NO.	READING FROM	READING TO	CUBIC FEET USED	BTU FACTOR	THERMS
1C	2023	2145	NS	122	

NEXT METER READ DATE 03/03/75

KEEP THIS STATEMENT FOR YOUR RECORDS

EXPLANATION	AMOUNT
PAYMENTS	9.78 CR
BALANCE FORWARD	19.22CR
CURR GAS CHARGE	36.05
TOTAL THIS BILL	16.83
EQUAL PAY PAST DUE	.00
EQUAL PAY PLAN AM	29.00
EQUAL PAY PLAN TOT	29.00
PAY THIS AMOUNT ▶	29.00

PURCHASED GAS ADJUSTMENT $1.18CR WAS DEDUCTED FROM YOUR CURRENT CHARGE

"Illogical logic" can trap unwary consumers, said reader R. Montgomery, who used his computer background to check out and validate this utility bill's accuracy.

BOSTON EDISON COMPANY
GENERAL OFFICES
800 BOYLSTON ST. BOSTON, MASS. 02199

BASIC	NUMBER OF DD ST APTS	PRESENT READING	PREVIOUS READING	MULTIPLIER CONST.	KWH USED	BILLING PERIOD FROM	BILLING PERIOD TO	AMOUNT
B	1	6318	1	800	12194	02195		44 57

SERVICE ADDRESS
13 Taylor
Boston
E.X. Ample

SAMPLE

ACCOUNT NUMBER
391353496006

.016963 Feb 2475 44 57

Includes cost of fuel of 13.57

Boston Edison blames the confusion over its bills on computers and offers customers an "easy" way to check out their electric bills.

Letters to the Editor

Macros Supply Labels, Not 'IBM-Generated Junk'

Kenneth P. Seidel has erred again [CW, March 12]. The OPEN, CLOSE, GET, PUT and DCB macros will only generate programmer-supplied labels and not "IBM-generated junk" (Release 21.7). Perhaps he has confused these macros with others?

I'm glad Seidel is not opposed to the use of macros to define standard records; but this is a recantation of his previous position since someone has to originally store data into symbols that define the record.

For myself, I don't object to the indexed labels that are usually generated for macros like CALL, LINK, SNAP, WTO, etc. I just don't like extravagantly generated lables like those from the DCBD macro; since you can have only one in your program, it will generate labels for all possible cases. But 45 labels for a half-word (DCBMACR) seems a bit much.

I trust this will conclude this discussion; however, I will continue to view any objectives with a sober eye.

R.A. Sobieraj

Perth Amboy, N.J.

University With Gift Idea Sets CW Geography Straight

While we were delighted to note the fine story, headlined "University Offers Unusual Gift Idea" [CW, Feb. 12], we bemoan the fact that *Computerworld's* sense of geography is a bit dislocated.

The University of Oregon is situated within the city limits of Eugene, Ore. CW's story carried the dateline Springfield.

Muriel K. Jackson
University of Oregon
Eugene, Ore.

Correction

The first paragraph of Kenneth P. Seidel's letter to the editor [CW, March 12] should have read:

"The kernal of the original discussion begun by Richard Barth on macro-generated symbols [CW, Oct. 30] concerned the laudable desire to exclude IBM's internally generated symbols (e.g., 1HB0007A or whatever) from ultimate appearance in a cross-reference listing. (In fact, it would be easy to criticize IBM's design philosophy of internal symbol manufacture; this is one good case for use of '*' as 'current address' and the use of relative addressing.)"

Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

For an Objective Approach

Monitor Stands Watch on Marine Corps' Mixed Sites

By Don Leavitt
Of the CW Staff

WASHINGTON, D.C. – The U.S. Marine Corps likes to do things in an orderly way, and it likes others to do the same. That's why the Corps acquired the Peripheral Monitor System (PMS) software from GTE Data Services, Inc.

Many of the Marine installations around the country and overseas are IBM 360 sites, with a mix of independent peripherals. To handle the maintenance on this equipment, the Marines have a third-party maintenance agreement.

That approach provides an objective approach to the problem and avoids the finger pointing that might develop if each vendor maintained its own gear, according to Charles Dasenbrook, a member of the Performance Standards Section of the Data Systems Branch at Marine headquarters here.

But the Marines are cagey. They wanted to be sure maintenance was in fact provided and the systems were working up to manufacturers' specifications.

PMS is a self-loading system that exercises the peripherals attached to a computer, reports its timing calculations and provides a comparison of those results to vendor specifications. The report gives an evaluation showing a percentage variation, up or down, from the "standard."

Each 360 site has a copy of PMS and does its own checking on local maintenance. Even the use of California Computer Products, Telex and Itel tape or disk drives poses no problem if the independents' models are truly compatible with IBM's 360 peripherals, Dasenbrook added; PMS equates them to the IBM specs without any modification of the coding.

The Marines have Potter double-density disk drives at one of the sites, however, and that did require some changes in PMS. The exercising instructions themselves were still good, but computations of disk speed based on the device's response to those exercises needed reworking.

Thus far, the system is limited to 360 environments since exercise routines, speed calculations and vendor spec tables have not been implemented for such devices at IBM's 3420 tape drives or 3340 disk modules, the vendor said. These modifications apparently would not be too difficult to prepare, but would differ from the earlier operations since the Rewinds of the 3420, for example, are different than the Rewinds on the 2400 series tapes.

The PMS operation isn't difficult either, but it isn't "a quick 10- or 15-minute test you can throw in the middle of a job stream," Dasenbrook noted. The monitor is used without either DOS or OS, for instance, and scratch tapes and disks must be mounted on all devices to be tested since PMS does Write to the output units.

While most of the peripherals being "watched" by PMS are within vendor specifications each time they are measured, there have been exceptions, Dasenbrook said, and they seem to prove the value of the checkout system.

In one case, he said, a disk drive at a Philadelphia area site was gradually dropping in speed and finally went "out of spec," even though normal preventive maintenance found nothing wrong. Based on the PMS reports, the third-party maintenance people dug deeper than usual for the problem and found it: a loose belt.

Once the belt was tightened, the unit was back in proper operation. And when the same sort of fading performance showed up on another disk drive at a different site, the Marines knew how to cope with it.

That kind of situation was exactly why the Marines acquired PMS in the first place, but there has been at least one unexpected advantage in using the package, Dasenbrook said.

In almost any installation, he explained, there is one disk drive that spins faster than the rest. It's still within specifications; it just "naturally" goes faster than the others. Once that drive is clearly identified, Dasenbrook said, the installation makes sure to put its most active – often the system pack – on that drive.

Infonet 'Encore' Allows Graphics

EL SEGUNDO, Calif. – An extension of the Financial Planning Simulator (FPS) analysis system on Computer Science Corp.'s (CSC) Infonet remote-computing network now allows users to produce a variety of graphics to show ratios, percentages, values, trends and other data relationships in files processed by FPS, the vendor said.

FPS is designed to support sales forecasting, pricing studies, cash management and budgeting and performance reporting. With the extension – called Encore – the data can be displayed in several ways if the user has either a Tektronix video display or Zeta plotting terminal, CSC said.

The user might call for a pie chart to show the percentage contributions of various items or a bar chart to show differences among absolute values, a network spokesman suggested.

Line charts that show the trends of a number of items, with trend lines smoothed mathematically or drawn as straight lines, are other options, he noted.

In addition to full-page charts, Encore produces two, four or six individual charts per page on user-selected parameters. Each plot can be gridded horizontally and vertically, with different scales used for left- and right-hand sides of the chart.

CSC is at 650 N. Sepulveda Blvd., 90245.

Salsbury 'Show Me' Tool Eases Assembler Program Debugging

PALO ALTO, Calif. – Initial debugging and later maintenance of IBM Assembler language programs is said to be eased considerably with the Show Me package now available from Salsbury Information Systems.

Built up from several macro instructions, the debugging tool generates formatted printouts of register contents and user data areas. Since the printouts can be triggered at any time, they can be used to trace intermediate program states.

Show Me allows interpretive execution of individual instructions in order to track down "wild branches and the clobbering of data fields," the vendor said. It can also be used to trap and repair program checks, allowing each test run to pinpoint multiple trouble spots, Salsbury noted.

Differs From Others

This utility differs from some other basically similar tools, however, since it includes several ways in which debugging code can be left in place but disregarded by the application program at run time.

A Nogen option, used at recompile time, leaves the debugging code in the source code listing but doesn't assemble any object code. Otherwise, various macros can be assembled but selectively turned on or off under Job Control Language (JCL) control so that output is generated only for the portions of the program under test, the vendor said.

The formatted Show Me output from a program check consists of four to 10 lines showing Program Status Word, module name, relative address of the offending instruction and the exception type; the general and floating-point registers; and the instruction itself, in mnemonic and hex format, along with the address and contents of its data fields.

If the Program Check is a data type, Show Me repairs any damaged fields and continues execution. If the problem relates to the instruction or addresses referenced, control is returned to the calling routine, allowing the programmer several different tests in the same run, Salsbury said.

Show Me operates under OS/360-370 or OS/VS and adds about 16K bytes to the application program if all options are being utilized. The package is available now for $885 from 1817 Woodland Ave., 94303.

DG Mini Users Get Cobol Support

SAN FRANCISCO – Users of the Data General (DG) Nova, Eclipse, or – in time, presumably – the recently announced C/300 minicomputer systems have a new independent source of Cobol support. ICT Corp. has introduced its Mini Cobol compiler which runs on a 16K Nova under RDOS.

As are most of the other Cobol processors for small systems, this one is in fact an interpretive compiler and does not produce final object code which can be used apart from the Mini Cobol software.

Described as "a surprisingly rich subset of ANS Cobol," it includes a number of impressive features even though the basic capabilities of the processor are "very close to the minimum ANS Cobol subset."

Features stressed by ICT include "powerful random and sequential I/O" and "elaborate PICTURE editing." More than that, ICT added, the processor is able to handle "an extremely large number" of data names.

The compiler also supports external subroutines, COMPUTEd expressions and extensive IF conditions. An "unlimited" Sequel Procedure Division size is also part of the ICT package, a spokesman noted.

Users also can work with complex data structures and data redefinition, as well as numeric and alphanumeric literals, he said. One-level table description and support of subscripting to get to "internal" table locations is still another feature.

The compiler operates under DG's standard RDOS environment with one disk and a minisystem, although additional peripherals may be used.

The Mini Cobol package includes a Sort/Merge utility program and is available now for $2,500. Additional material including a user manual and installation documentation is also available from ICT at Suite 318, 465 California St., 94104.

Data Base Without Management System Pays Off

By Don Leavitt
Of the CW Staff

HARTFORD, Conn. – The needs of user departments and the operational requirements of the DP department must both be considered when a hardware/software upgrade is being planned. If both sides are taken into account in the plan, the result can be the creation of a data base that is useful to all who need it and manageable by those who have to control it.

With that in mind, Systems Analyst Robert H. Murphy Jr. of Wiremold Co. told a Computer Caravan workshop on data base management systems how his installation converted from an IBM 1401 to a Burroughs B2500 and the Production Control System (PCS).

But the move took a lot longer than originally expected, and Wiremold still doesn't have a true data base management system (DBMS) – even though PCS was written by Burroughs at the same time and apparently with much the same logic, as Forte, which is a Burroughs DBMS also.

Wiremold began looking for a replacement for the 1401 in 1972, actively considering four vendors: Burroughs, Honeywell, IBM and Singer. The needs of the manufacturing plant manager were geared to the company's desire to provide a "98% level of service" to its customers, Murphy said..

The DP manager, on the other hand, wanted an operating system environment that would not require a full-time systems programmer, in addition to good software support with upward-compatibility potential and the use of a single language. By then, Murphy was the only one at Wiremold who knew how to program the 1401 in SPS.

Burroughs proposed the B2500, and its Master Control Program is good, Murphy admitted. He noted, however, in a backhanded compliment, "Burroughs is as reliable as most vendors" in terms of system support.

Price, reputation and consideration of the other requirements led, in any case, to Burroughs and its PCS. Then the problems of conversion started.

Engineering Specifications Key

Key to the manufacturing-based data files had to be the engineering specifications that shaped the parts list and production routing since, without those working correctly, nothing else mattered. Once conversion was made, Murphy hired temporary help to proofread the old and new files, with the thought that nonspecialists would spot errors better than those "who knew what the file should say." But even the temporaries missed some errors "since they got tired too," he said.

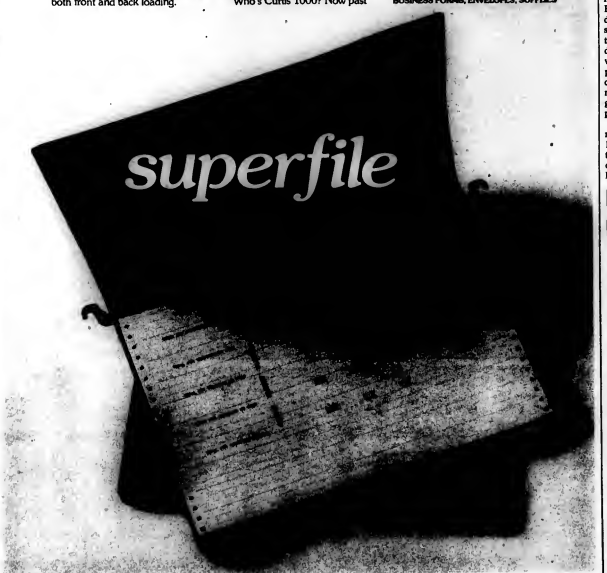
Checkout of the production plan files and reports generated from them was harder, since comparisons couldn't be made between the 1401 and Burroughs output. Updating of the 1401 file had been stopped, and people in the manufacturing area were unwilling to take actual changes into account when reviewing the two outputs.

Daily Updating a Problem

Wiremold's daily updating schedule was a problem, too, since the company personnel tended to group many orders into one production run, and the Burroughs software was single-order oriented. Finally, the work-in-progress modules of PCS were scrapped, and Wiremold wrote its own routines for this phase of the operation, Murphy said.

On a more optimistic note, he added, performance reports are a useful adjunct to the system that has become practical only in the Burroughs environment. The updating of both cost and labor standards files is much easier on the B2500. Though Wiremold doesn't have incentive pay, each worker's effectiveness is reported to his foreman who encourages better work if that is needed or simply offers congratulations if that is more appropriate.

Some two years after the Burroughs choice was made, the 1401 was finally phased out of the manufacturing control part of Wiremold's DP operations, Murphy concluded.



Package Plans Electrical Nets

ATHENS, Ga. – Designers of radial primary electrical distribution feeder systems can use a Univac 1108 under Exec 8 to compute nodal voltages, losses and line currents with a program now available from the Cosmic clearinghouse.

Under the distribution feeder analysis program, cataloged as program number COS-02420, users can calculate maximum and minimum fault currents at each node for a delta-wye grounded connection of the distributing station transformer, according to Cosmic.

If computed voltages are outside acceptable limits, voltage corrective devices, capacitors and regulators are added in accordance with a predetermined set of rules.

Written in Univac's Fortran V, the program includes "approximately 8,050 cards," according to Cosmic, and can be purchased for $1,380. Documentation is separately priced at $12.

Cosmic is at 112 Barrow Hall, University of Georgia, here in Athens, 30631.

Control, Process Split OK, But...

Guidelines Proposed for Modular Program Planning

By Josh Turner
Special to Computerworld

Seven months ago Michael Karmi showed how modular programming contributes to program reliability, maintainability and extensibility [CW, Aug. 14]. In his discussion, he suggested a program might be divided into a control module, which would perform major decision-making functions, and processing modules, which would perform individual processing functions.

Concepts and Techniques

These concepts are valuable so far as they go, but the absence of specific guidelines for the content of these modules and for the relationships between them makes it difficult to put these ideas into practice.

To develop such guidelines a few new terms are needed. A *control variable* is any variable having solely to do with controlling the order of execution of program statements (e.g., flags, switches, etc.). A *processing variable* is any variable having any direct relation to the actual data being processed by the program. *Processing statements* include all I/O statements as well as any other statements which assign values to processing variables.

Using these new definitions, a precise description can be given of control modules and processing modules, and it will be useful to add a third concept – that of service subprograms.

Specifically, a *control module* controls the execution of a closely related group of functions and handles all major decision making relevant to that group. Its principal components will be control structures (IF–THEN–ELSE and DO-WHILE) and calls to modules it controls. Processing statements are prohibited.

A *processing module* performs a single specific (processing) function. Each statement within the module is related to the performance of its specific function and no other. Processing modules can call only service subprograms.

With both types of modules care must be taken to include no extraneous code. No code should be included in one branch of the program which directly affects the operation of other branches.

Thus, if a control module controls two processing modules, and if some control variable affects the operation of both of them, then the value of that control variable should not be set in either processing module but in the control module.

A *service subprogram* consists of a main subprogram and any number of submodules under its control, which together perform a single service for the calling program (inverting a square matrix, reading a record from a file, etc.). A service subprogram is built (structured) using control and processing modules, as if it were a separate program, and in fact may be shared by many programs.

All data passed to the subprogram is through its argument list – It is not allowed to access the COMMON or EXTERNAL blocks of the calling program.

Tree Structure

In addition to defining the content of these three types of program units, we can define the relation between them: it is a hierarchical top-down tree structure that uses strict level-to-level relationships. In fact, a structure diagram of a program showing the relationships between its modules will look very much like a family tree.

At the top, the highest level, is the patriarch of the family, the main routine. From that point on down, a module on any level may call only modules on the immediately following level – its immediate descendents – and may be called only by a single module on the immediately preceding level – its immediate ancestor.

Service subprograms are an exception: they may be called by more than one module, and these modules may be on different levels of the calling program. But since service subprograms are built as separate programs, they need not appear on the structure diagram of their calling program; each will have its own structure diagram.

These ideas are readily integrated into the concept of top-down program design. Initially, the analyst conceives of a prospective program as performing a single function for its users. As the analyst examines that function, suppose he breaks it down into five separate subfunctions.

At this point his structure diagram of the program will show a single control module calling five separate processing modules – one processing module for each of the five subfunctions performed by the program.

The analyst continues by examining the function performed by each of these processing modules, breaking it down into smaller subfunctions and replacing each processing module on his structure diagram with a control module and processing modules under its control.

Now suppose that on examing two of his processing modules, the analyst realizes that each requires the performance of the same function or service. He will start to build a separate service subprogram to perform this service for these two processing modules, and he will initiate a separate structure diagram for this subprogram.

Analysis of the main program and the service subprograms it spawns continues until a point is reached where the function performed by each module is small enough to be coded in less than 50 lines. (This is an amount of coding which fits on one printer page and is easily grasped, easily debugged.) Once the structure diagrams are completed, actual coding can begin – again, from the top down.

If, as the program is coded, any module greatly exceeds the limit of 50 lines, it may be desirable to further divide it. But if the program is carefully designed before coding starts, the need for such restructuring will be minimal.

Finally, extensions to the program require only a continuation of the initial design process. The program, with its structure diagram, can grow as needed. Reliability, maintainability and extensibility are ensured.

Turner is a scientific programmer/analyst in the Computer Services Department of the Federal Reserve Bank of Philadelphia.

CULPRIT has won every benchmark in the last two years. If this can be proven not true, we will be happy to run an ad saying we were wrong.

The benchmarks were conducted at the request of prospective users to determine which system to buy. Cullinane personnel produced the requested reports using CULPRIT. Our competitor's personnel produced or attempted to produce the reports using their retrieval systems. In other words, a typical benchmark situation, where the work was done on the prospective user's computer.

Explanation

Recently a competitor ran a comparative ad between D/A (Data-Analyzer), CULPRIT and other retrieval systems in this publication which we feel was misleading. Consequently, we have an obligation to bring facts regarding benchmarks to the attention of those who may have read that ad. This is particularly important since those who have had no personal contact with the Cullinane Corporation may decide to buy another system without evaluating CULPRIT.

Additional Information

The recent D/A ad says to ask their computer. We say ask your own computer and run a benchmark to see for yourself. Find out why so many organizations, when the true facts were in, bought CULPRIT. Here are some points that are very important:

1. CULPRIT has a unique combination of power, speed, and ease of use.

2. CULPRIT has been interfaced with all kinds of file structures including IDMS, IMS, and TOTAL database management systems, plus the UCC-10 Data Dictionary; TSO; Wylbur; IBM's CIF, UCC's RDMS, Wang's Payroll, Syscon's Mortgage Loan, and many others for Banking; IBM's ALIS/CFO for the Insurance industry; and BOMP, DBOMP, MRP, and CFMS for the Manufacturing industry.

3. CULPRIT can produce complex reports, not just simple reports.

4. CULPRIT can be used as the output processor of production systems because of its great speed.

5. The EDP-AUDITOR version of CULPRIT is considered the premier audit package on the market. Many non-programmers in user departments use CULPRIT very successfully.

6. We have a very active EDP-AUDITOR/CULPRIT Users Group which has significant influence over new enhancements to the systems in the future. The next meeting is in Washington, D.C. on April 23-25.

7. Our three month trial plan provides you with the opportunity to use the CULPRIT system in your environment, and our unique license-to-use and renewal plan assures that existing CULPRIT users are just as important as new CULPRIT users.

8. The Cullinane Corporation will make every effort to make you a successful user. Datapro recently surveyed users of our IDMS Database Management System and found our support was the best by far of any vendor.

9. Cullinane Corporation may not have the most users (only 350) but we feel we have the most enthusiastic. They know we care.

If you would like further information or would like a benchmark, please contact the Cullinane Corporation at (617) 742-8656, or attend one of our free seminars at the Computer Caravan.

Cullinane Corporation

One Boston Place, Boston, Massachusetts 02108. Telephone (617) 742-8656

Data Briefs

Gandalf Digital Data Set Works on Five-Mile Links

OTTAWA – Gandalf Data Communications Ltd. has upgraded its LDS limited-distance digital data set with a model called the LDS 110.

The digital data set does not require lines of DC continuity and can operate over two-wire and four-wire circuits. In full-duplex mode over four-wire circuits, the LDS 110 will handle transmissions up to 4,800 bit/sec asynchronously, the company said.

The unit provides a "very low error rate performance on 26-gauge wire up to five miles" on four-wire facilities. In two-wire half-duplex mode, the LDS 110 will transmit up to 4,800 bit/sec with a line turnaround of about eight msec, the company said.

The LDS 110 includes a strap-selectable control carrier feature and has power and carrier indicators.

The data set costs $300 from the firm's U.S. affiliate, Gandalf Data, Inc., 466 Central Ave., No. 28, Northfield, Ill. 60093.

Multiplexer Has Optional Modem

PENNSAUKEN, N.J. – A time division multiplexer designed to accommodate an optional integral modem has been introduced by Infotron Systems Corp.

Designed primarily for the small- to medium-size data communications configuration of up to 18 channels, the Timeline 180 carries a base price of $2,000 (including power), with interface prices starting at $150 each.

The optional modems are à 4,800 bit/sec unit starting at $3,800 and a 9,600 bit/sec unit at $7,500.

The 180 offers speed mixing of input terminals, both asynchronous and synchronous; standard output rates from 1,200- to 9,600 bit/sec; optional bandsplitting for combining high-speed inputs with low-speed multiplexed data; total transparency to all data and code formats; the option to software demultiplex by central mainframe; and optional "thru-putting," or multidrop, capability. Infotron is at 7300 N. Crescent Blvd., 08110.

ASC Installs Customer Service Desk

GERMANTOWN, Md. – American Satellite Corp. (ASC) has established a customer service desk to improve and maintain customer relations for data and other users.

The purpose of the customer service desk is to provide a central point where ASC customers can report service difficulties, request information on billing and make inquiries on service installation schedules, the firm said from 20030 Century Blvd., 20767.

Bell Jacks Up Prices for Interstate Services

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – AT&T has increased rates for data equipment and services used with Bell interstate services.

Amounting to a 5.1% hike instead of the 7.8% originally requested by the telephone company, the new rates were filed on one-day notice and went into effect March 9.

The increases approved by the Federal Communications Commission (FCC) will be reflected immediately in user's monthly bills. Representative increases, given by AT&T as they apply to three popular data sets in the Bell line, show the 210 jumped from $55/mo to $55.80/mo while installation was increased from a one-time charge of $75 to $78.85.

The 208 data set, formerly $125/mo, is now $131/mo with installation going from $150 to $158. The 209 data set was $230/mo and is now $242/mo. Installation on the 209 went from $200 to $210, an AT&T spokesman said.

Private line rates were hiked with high/low density mileage charges affected accordingly. Monthly rates for high-density interexchange routes went from 85 cent/mile to 89 cent/mile and low-density routes went from $2.50/mile to $2.63/mile.

Short-haul rates for links under 25 miles were increased from $3.00/mile to $3.15/mile, AT&T said.

A typical high-density route between New York and Washington, D.C., was $295.10/mo and now is $309.54/mo, while a link between New York and Dallas was $1,283.65/mo and now is $1,344.61/mo.

Also increased were the costs for teletypewriters used with private line services, including the Dataphone Digital Service (DDS). The Model 33 ASR was hiked from $63/mo to $66.20/mo while the Model 35 ASR went from $130/mo to $137/mo.

Rates for the Dataspeed 40 CRT were not affected by the increase since it was tariffed after the cut-off date of September 1974, an AT&T spokesman said.

For interstate dial-up data users, the cost of Data Access Arrangements was increased with the CBS unit going from $4.75 to $5.10 and the CBT rising from $3.50 to $3.75. Other connecting arrangements were raised accordingly.

For data users with Wats service, the increases depend on the distance for which the user subscribed. Full-business Wats, which includes a basic 240 hours per month, went up 33% for distances up to 300 miles. But for distances over 1,600 miles, the rates dropped by 1%, an AT&T spokesman said.

For measured-time Wats users, rates for distances up to 150 miles were increased as much as 21% while for distances over 800 miles there was a savings up to 14%. For measured Wats up to 800 miles, the rate was $145/mo with $10.85/hour over the basic 10 hours. This is now $175/mo and $13.10/hour.

An example of measured Wats that has dropped would be a link over 2,000 miles which was $295/mo plus $22.1/hour. This is now $255/mo for the basic 10 hours with $19.10/hour thereafter, AT&T said.

IBM's Chief Scientist Says

Future Nets Must 'Heal Themselves'

By Ronald A. Frank
Of the CW Staff

PARIS – Teleprocessing networks of the future will have to heal themselves, according to Lewis Branscomb, vice-president and chief scientist at IBM.

Speaking at a recent Organization for Economic Cooperation and Development conference on trends in computer/telecommunications technologies, Branscomb said "the need for remote diagnosis of the state of the system is heightened" in satellite and other teleprocessing systems. Early experience with remote diagnostic techniques suggest the concept is feasible and "even remote 'repair' of logical faults in software can be made."

Future teleprocessing systems will have to have "extendability," which means the teleprocessing application and the system on which it runs must be able to grow with the user's changing needs, Branscomb told the conference.

Most of the problems that data and other users have had in the past with limited upgrade capabilities will be overcome, he said. In teleprocessing, as in computing, the user will be dependent on software to define the system and provide for the optimization of its function and cost effectiveness in spite of changing environments.

"System control programs with many thousands of modules will find their place in many modes of future information networks. They must fit together the user's application, invoke the programs and access the data in various parts of the network and optimize the use of communications," he said.

Major Application Areas

The major application areas that apply to teleprocessing are interactive transactions that require response in a second or two; communications messages that take a few minutes; time-shared batch computing and query systems from remote job entry stations where response time varies from seconds to many minutes, and "number and data crunching" that may run for hours.

"Teleprocessing will be the dominant technology, making automation of the office and of the mails possible," Branscomb told the conference, and this in turn will generate large quantities of data traffic. But this process will be slowed by cost, quality and acceptability of the I/O devices.

In many countries, "interim" specialized carriers represent an opportunity for experimentation, but these systems are often incompatible and contain "procedural inflexibilities" in the interest of data communications optimization. There is a need for an "internationally compatible data communications capability that permits the full range of application types to be efficiently performed," he said.

The possibility of low-cost customer-premise earth stations that can send and receive data directly to a satellite and thus bypass land nets was described as interesting by the IBM official. The satellite would serve as little more than a repeater and every message sent up would be broadcast down to every ground station within the system bandwidth and range.

"With encryption to provide security and addressed message segments to permit each station to peel off its traffic, no physical switching system [would be] needed," Branscomb explained. With a time division multiplex system, hundreds of users could share the system, each with a modest interfaced traffic load.

Alternatively, when required, the entire bandwidth of the satellite channel could be given to one earth station to send several million bytes of data from one CPU to many others, updating their data bases, he said.

In describing current transmission characteristics and possible today's applications typically have calls from one to 10 seconds in holding time with from eight to 800 calls per line per hour. Users of these applications include banks, airlines, manufacturing and "freight disposition" nets. Another alternate usage area today is calls lasting from one hour to more than 10 hours where large blocks of data are transferred.

Burroughs Adds Four Printing Systems

DETROIT – Burroughs Corp. has introduced the TC 4000 series of printing terminal systems. The series includes four models which are designed for printing, storing, displaying and transferring information in a data communications network.

The TC 4000s enable manual data entry through a standard typewriter keyboard and automatic data entry through magnetic tape cassette or industry-compatible minidisk peripherals that are available as options.

An additional option is a Burroughs Self-Scan panel for displaying information received from another system or entered on the TC 4000 keyboard.

The terminals feature a wire matrix console printer which operates at 60 char./sec, transmission speeds ranging from 75- to 9,600 bit/sec, single or dual sending and receiving buffers with a capacity of up to 1,536 characters and a "forms compose" feature. This programmable feature is said to increase the speed of printing and contributes to efficiency in use of the data communications line.

In a network, TC 4000s can communicate with each other, with a central mainframe and with Burroughs terminals such as the TD series of input and display systems, the TC series of terminal computers and the TCS 1000 and B 770 series of system and communications processors.

Terminal Transactions

The panel display, which has a capacity of 256 characters, enables the TC 4000 operator to display data entered on the keyboard for transmission to another system and to display data that results from an inquiry to another system.

In both instances, the TC 4000 operator can choose whether to print the data displayed. This selectivity can provide extensive savings in forms costs, the spokesman added.

The "forms compose" feature optimizes movement of the printer or forms to positions where information is to be printed and eliminates unnecessary printer and paper movement, the company said. This feature provides more efficient utilization of communications lines by eliminating the need for the transmission of spacing or line-filling signals.

In addition, the "forms compose" feature enables the TC 4000s to perform half-line advance or reverse for mathematical and scientific notations and business graphs.

The electronic keyboard of the systems is equipped with special function keys for forms handling and printer control, and it includes 16 keys for data communication and peripheral control. The keyboard conforms to the Ansi-Ecma standard and generates the full set of Ascii data communication control codes.

Burroughs TC 4000 terminal systems have plasma displays.

Two rows of operator communication indicators display the status of the TC 4000 and its peripherals. The systems communicate in asynchronous and synchronous mode at speeds ranging from 75- to 9,600 bit/sec over leased or switched lines or by direct connect lines.

The four models in the TC 4000 Series include keyboard send/receive; receive only; keyboard and automatic send/receive with magnetic tape cassette; and keyboard and automatic send/receive with industry-compatible minidisk.

First deliveries are scheduled for the second and third quarters, except the disk system, which is slated for the third quarter of 1976.

Purchase prices for the new systems range from $4,945 to $9,495 depending upon options selected. Comparable monthly lease prices range from $164 to $295.

Four-Phase Models Extend IV/40 Series

CUPERTINO, Calif. – Four-Phase Systems, Inc. has added two models to its System IV/40 line of intelligent terminal systems.

Intended for use in networks where one or more video terminals are required at a remote site, the systems are upward-compatible with other System IV/40 models and with Four-Phase's larger System IV/70.

The Model 4100 is designed for remote batch applications and is compatible with IBM 2780 and 3780 terminals. The system includes a 24K-byte processor with an integrated 354K-byte diskette drive.

A 1,152-character video console is provided for operator control and monitoring of system and job status. The system supports a variety of peripherals including 300 to 600 card/min card readers and 300 to 1,800 line/min printers.

The price for a complete system with a 300 card/min card reader and 300 line/min printer is $744/mo on a three-year lease.

Key-to-Disk Applications

The Model 4200 is designed for remote key-to-disk applications and supports up to 12 video keystations for data entry. The system includes a 24K-byte processor with an integrated 2.5M-byte disk drive.

Extensive editing and validation capability is provided by the system with Data IV/70, the firm's data entry package. The price for a four-terminal system with 1,152-character displays and 2780/3780-compatible communications is $614/mo on a three-year lease.

Both the 4100 and 4200 may also be configured as on-line display systems for interactive access of IBM System/360s and 370s using IBM 2260 line protocol. In this mode, the systems can support up to 32 video terminals.

For on-line use, a 16-terminal 4100 with diskette and 480-character displays rents for $1,041/mo on a three-year lease. A similar system with 32 240-character displays rents for $1,729/mo.

All lease prices include maintenance, software, systems engineering support and systems education services. First deliveries are scheduled for the second quarter from 19333 Vallco Parkway, 95014.

Airline Saves With 19.2 Kbit/Sec Terminal Link

By Ronald A. Frank
of the CW Staff

DENVER – A major airline with a DP center here is transmitting large block transmissions of microfiche and other data using a terminal system that saves both time and costs.

The carrier uses Mohawk System 2400s with a communications software package to transmit 8K tape image blocks of data between Denver and Chicago. Without going to wideband data facilities, the airline transmits at an effective speed of 19.2 kbit/sec using two 9,600 bit/sec private lines equipped with a Codex biplexer.

At each end of the dual lines is a Mohawk System 2400 communications processor, equipped with a Codex biplexer. Two 9,600 bit/sec modems are connected to each biplexer, which in turn is interfaced to the Mohawk communications controller.

The modems automatically adjust to line conditions by falling back to 7,200 or 4,800 bit/sec if necessary. The biplexer provides additional safeguards by switching all data to one line if either modem or line fails.

The System 2400 terminal system includes a 32K processor, 1,600 bit/in. tape drive and the Streak software package, which a Mohawk spokesman described as a transmission package based on IBM 2968 protocol. The protocol is said to utilize binary synchronous communications in a similar manner to the IBM 1401 printer, the spokesman said.

Better Throughput

The airline transmits 8,776 char./block, the equivalent of an 11-in. computer form. Data rate is approximately 68 block/min or nearly 600K char./min. The airline reports this is better throughput than it experienced with mainframe-to-mainframe communications. The spooled data is subsequently reduced to microfiche at the Denver end.

The carrier previously transmitted its data from an IBM 370/195 in Denver to a 370/145 in Chicago. About 20,000 records per day of high priority data was sent.

The airline then installed three Mohawk terminal systems at each end of the link. The transmissions which used to take about 10 hours to complete now are done in one hour, according to the Mohawk spokesman.

One of the reasons for the time savings is that the Streak package uses data compression techniques to reduce an 8K block of data down to about 3K. The package adds a label check on both ends of the transmission and error checks to the basic IBM protocol.

Even with the cost of the terminals, the airline has cut the cost of the communications application by about one-third with the installation of the terminals and the Streak package. And, by using the CPU-generated tapes on the terminals, the mainframes are free for other processing.

The Streak software is available free to Mohawk System 2400 terminal users. The package is not available for use with other terminal systems.

The package can also provide formatted printing in the background and it will run concurrently with Mohawk 2400 key-to-disk operations.

Terminal Transactions

GA Configures Series Of Remote Devices, Software Packages

ANAHEIM, Calif. – A series of intelligent remote batch communications terminals has been introduced by General Automation (GA).

The three configurations in the series – designated the RBT-I, RBT-II and RBT-III – are available with a selection of field-proven software emulation packages that are said to accommodate most common communications protocols.

All configurations are functionally compatible with most other terminal devices, including IBM 360/20 remote Hasp workstations, IBM 2780 and 3780 batch terminals, Control Data Corp. user terminals and Univac 1004 terminals.

Communications Only

The RBT-I is a communications-only terminal designed to speed data transfer to and from a remote mainframe. It can be expanded to an RBT-II configuration by adding a disk-based operating system which provides the additional capability for local batch processing, message spooling and unattended operation.

The RBT-III adds a real-time operating system which provides concurrent local foreground/background processing capability.

The RBT series costs at least 15% less than competitive models of comparable performance, a spokesman said. The RBT-I ranges from $19,200 to $28,200; the RBT-II from $31,500 to $40,800; and the RBT-III from $39,850 to $48,150.

GA is at 1055 S. East St., 92805.

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Users Agree

COM Brings More Than Paper Savings

By Vic Farmer
and Catherine Arnst
Of the CW Staff

Users switch to computer output microfilm (COM) for many reasons, the foremost being the savings in paper costs. But side benefits can include lower storage space requirements, cleaner copies, increased CPU time available and, in some cases, a reduction in equipment rentals.

Three COM users – from such diverse fields as medicine, manufacturing and even municipal government – illustrate both the paper savings and other possible COM benefits.

In Portland, Ore. for example, up to 8,000 computer-generated medical tests are processed daily at a lab, but legal requirements call for the retention of records of some tests for as many as seven years.

To avoid a deluge of computer printouts, United Medical Laboratories uses COM. But the main advantage of the COM system, the lab claimed, is that it returns its rental cost every two weeks just in the elimination of the traditional paper form sets.

Volumn Benefit

According to Dave Ostenberg, operations manager of the lab, "Just our daily computer-generated medical test reports would create a 5-ft-high stack of paper if we retained a file copy on paper instead of film.

"Our output is in the form of 8-oz. cassettes, each containing 2,000 reports. A total day's output is the equivalent size of a 2-in.-high stack of tabulating cards."

A separate building would be required for archives if paper were still used, he noted.

The laboratory produces seven film copies of each report in addition to a paper original which is sent to the physician or hospital/clinic client. The film cassette duplicates are viewed by the lab's customer service personnel when responding to clients' phone requests.

"The savings we enjoy by using film instead of paper was one of the prime factors in our switching to the Memorex 1600 COM system," Ostenberg explained. He estimated daily film costs now run at about $5 per 1,000 pages of reports compared with approximately $45 per 1,000 pages with the alternative of using a multiform paper set – a difference of more than $300 per day.

The microfilm printer, which is connected to the lab's IBM 370/145, prints lines up to 132 characters wide at speeds up to 10,000 line/min.

"Because of the favorable cost of film and the speed of the COM, we are converting other reports to the COM system," Ostenberg said. "As a result, we are improving our computer throughput."

A monthly listing of all transactions performed by the lab for the previous month, for example, used to take 12 hours of computer time since the computer was bound by the speed of the impact printer. "Now the listing requires

Dave Ostenberg observes a patient medical test record over a microfilm viewer.

less than one hour of computer time," Ostenberg said.

Customer service personnel at the laboratory have found a reference to cassette-contained data through automatic viewers is more convenient and about one-third faster than referencing binders containing hard-copy reports. All seven viewing stations receive cassettes containing images of equal clarity to the master file as opposed to clarity limitations of carbonized forms.

More Microfilm Runs

Another user saving money with COM is Twin Disc, Inc. which, by eliminating paper reports on a weekly computer inventory run, estimated paper cost savings of about $1,800/mo.

According to Ken Sullivan, DP manager for the manufacturer of heavy duty transmissions, Twin Disc's 370/135 operation "was excessively burdened with printing operations. Because of the relief we gained from the COM unit, we were able to downgrade the speed of our hard-copy printer from 1,100- to 600 line/min and thus save an additional $150/mo on equipment rentals."

Although more difficult to quantify than equipment and paper savings, Sullivan emphasized the operational advantage in controlling production with COM-generated reports. Because of the legibility limitations of carbonized copies when printing with paper, only five weekly inventory status reports were formerly prepared.

Reference by expediters to gain the latest inventory status when answering inquiries from production and sales personnel was thus restricted to binders centrally located at five reference stations throughout the company's Racine and Rockford (Ill.) plants.

"Expediters remote from these reference stations relied on hard-copy reports distributed on a routine priority basis from our primary reference stations. Thus the data in certain locations could be outdated by up to a month," Sullivan noted.

Now 25 expediters, planners and others use individual desk-top viewers instead of bulky binders.

Another major efficiency Twin Disc gained was the elimination of decollating

(Continued on Page 24)

Printer, Communications Added to Univac 1900

BLUE BELL, Pa. – Communications capabilities and a 200 line/min printer have been added to the Univac 1900 key-to-disk system.

The communication adapter allows 1900-to-1900 data transmission and communications with major Univac and IBM systems, Univac said.

The 200 line/min printer, along with communications, will allow a 1900 to print inventory reports, sales itineraries, delivery schedules, audit trail data and other information at remote sites connected to central computer systems or other 1900 systems, Univac said.

The printer provides a 96-character ascii set and 132 positions and prints up to six-part continuously sprocketed forms which may be from 4-in. to 14-7/8-in. wide.

The printer, attached to the 1900 system, provides a printout of data either directly from the 1900 system or, alternatively, information received from a central computer system or another 1900.

The communication adapter allows the 1900 to communicate with the Univac 1100 series, Series 90, 9400 and 9480.

A system can also communicate with IBM's 360 DOS systems with Btam; 360/370 OS with Btam, Qtam, or Tcam; 360/370 under Hasp, Hasp II or ASP; System/3 with RPG-II telecommunications and the 2770, 2780 and 3780 terminal devices.

The 1900 with communication adapter can transmit data at up to 9,600 bit/sec, depending on the lines and/or modems, in either a dedicated or switched environment, Univac said. Data communications, data entry and supervisor functions can exist concurrently with a 1900.

The communication adapter may be purchased for $4,896 or leased for $120/mo, including maintenance. It will be available in December.

The printer may be purchased for $14,976 or leased for $390/mo, including maintenance, starting in August.

Automatic Tapes, Multiplexer Offered on Univac 90/30

BLUE BELL, Pa. – Univac has enhanced its 90/30 system with magnetic tape subsystems and an internal multiplexer.

The multiplexer, housed in the mainframe itself, allows the connection of up to eight subsystems with a throughput rate of 83 kbyte/sec.

Designated the Univervo 10 and 14, the tape subsystems have automatic tape loading, tape cartridges, dual density and 7-track NRZI format capability.

The Univervo 10 has a speed of 25 in./sec and a transfer rate of 40 kbyte/sec utilizing 1,600 bit/in. 9-track phase-encoded tape. The Univervo 14 has a speed of 60 in./sec and a 96 kbyte/sec transfer rate on the same recording format.

Standard tape reels without cartridges can also be used with the automatic loading and threading capability.

High reliability is assured on both tape subsystems through the use of a single capstan drive design with a minimum of mechanical parts, resulting in "minimum tape wear and increased subsystem availability," Univac said.

Both tape drives employ the phase-encoded recording technique allowing the recording of data at 1,600 bit/in.

Dual-density versions of both models are available for recording either 9-track phase-encoded (1,600 bit/in.) or Non-Return to Zero (800 bit/in.) data. A 7-track NRZI version recording at 800/556/200 bit/in. is also available.

Both tape units are attached to the 90/30 through a 5045 control unit. The control unit is housed within the same cabinet as the first two tape units. Up to eight drives can be accommodated by the control unit.

A Univervo 10 and its control unit can be field upgraded to a Univervo 14.

A minimum Univervo 10 subsystem consisting of a control unit and two tape units rents for $914/mo on a one-year contract, including maintenance, or can be purchased for $34,944.

An equivalent Univervo 14 subsystem rents for $1,331/mo on a one-year contract, including maintenance, and has a purchase price of $50,928.

The internal multiplexer rents for $300/mo on a one-year contract, also including maintenance, and has a purchase price of $12,480.

Users Find There's More to COM Than Paper Savings

(Continued from Page 23)

and binding. Formerly, with a smaller volume of reports than it generates today, it took two people an entire day to accomplish this task.

Now the master film is previewed, duplicated into 25 copies and loaded into a cassette within four hours. Reports in the form of microfilm cassettes require only 2% of the space required for hard copies.

Twin Disc's inventory status reports are produced on a trailing week basis, projected for 99 weeks. Containing a total of 50,000 individual items, the inventory report shows quantities on order from vendors, quantities requested by customers, lead times, order points and quantities, costs and other data pertinent to expediting production and answering customer and internal inquiries.

All data for 99 weeks for the 50,000-part inventory is captured on a 100-ft master film reel, equivalent to approximately 2,400 pages of hard copy.

Another major COM report is the company's "Cost Close Out of Shop Orders," produced every week. Recorded is data pertaining to individual shop orders completed during the past week. Identified are individual part numbers, manufacturing operations and extensions of quantities vs. both actual and standard costs, plus any resulting manufacturing variances.

Other smaller microfilm run on the Memorex 1600 COM unit involve various accounting records. Says Sullivan, "We are constantly alert to any possible conversions of paper reports to film in view of the soaring costs of paper records."

Aid for a City

Baltimore's municipal government, on the other hand, found increased automation through COM was one way to fight the rising costs of managing a city of 900,000. Since it installed a COM system three years ago, it has saved space, improved services and reduced paper costs by 84%.

Baltimore's senior management analyst, Ronald D. Clemsen, pointed out some of the savings accrued by the system. "It now takes just nine hours to handle a recordkeeping task that previously required at least 38 hours to complete," Clemsen said.

He also estimated that 100 feet of COM film handles what used to take 3,000 pages of hard copy, thereby saving 2,700 sq ft of storage space in one city agency alone.

In addition, he said, media costs now run about $5 per 1,000 film reports as opposed to about $45 per 1,000 using multiform paper sets.

Other benefits include the ability to microfilm records during a weekend so they can be used during regular working hours and rapid communication between employees of city departments and taxpayers requiring access to records.

Several city agencies are serviced by the COM system. There are 20 viewers stationed in various offices where operators can command any specific record by accessing the correct film cassette.

Dranetz Line Monitor Notes Power Outages

SOUTH PLAINFIELD, N.J. – Dranetz Engineering Laboratories' Series 606 line disturbance analyzer monitors disturbances in line power.

When any preset value is exceeded, the printer on the 606 records the input channel, time of day, type of disturbance, magnitude and duration. While printout is going on, the computer can store data on 15 additional disturbances.

In addition, the unit records any power outage of more than 1 second and prints the times of outage, return and the voltage after return.

The Model 606-1 sells for about $2,000 from the firm at 2385 S. Clinton Ave., 07080.

Add-On Memory Fits Xerox Sigma 5, 6, 7

IRVINE, Calif. – A random-access planar core memory system from Telefile Computer Products, Inc. can be used as an add-on, replacement or extension memory for Xerox Sigma 5, 6 and 7 computers, the vendor said.

Available in 16K-word increments, it can increase capacity by up to 128K at a cost some 25% less than comparable memory from Xerox, according to Telefile.

The compatible memory attaches directly to the CPU or any standard resident memory, using Xerox cables. It is also fully software transparent. Access and cycle time specifications equal or exceed those of the equivalent Xerox memory, Telefile said.

Simple Expansion

The system is also said to be designed for simple future expansion. Each memory bank has one to six ports. Six-port interface capability is, therefore, possible without adding the normal port expansion feature. Interleave options of two-, four- and eight-way (more than the resident memory) are switch selectable.

Additional construction features of the 650 nsec memory system include integrated circuit logic functions. Modular design permits fault isolation, and plug-in assemblies speed spare replacement, the company said.

To match the application, the Telefile memory can be purchased in any combination of 16K-word memory banks and can be configured to start from any address and end at any address within this range. Address ranges between the 16K segments do not have to be consecutive.

The company is at 17131 Daimler St., 92705.

Memorex Floppies Sustain 10 Million Pass/Track Rate

SANTA CLARA, Calif. – Memorex claims its Markette floppy disks can sustain 10 million pass/track durability.

The diskettes are priced at $7.50 each in boxes of 10 from the firm at San Thomas at Central Expressway, 95052.

EMM Disk Drive Costs $920

HAWTHORNE, Calif. – EMM Computer Products has priced its Caelus CXDD disk pack for the IBM 3336-11 disk drive at $920.

EMM is at 12624 Daphne Ave., 90250.

Correction

The price per spindle of Peripherals General, Inc.'s DSS 844/741 storage system is $9,500 [CW, Feb. 26].

Would odds 8,000 to 1 in your favor interest you?

If you're involved with a computer operation in any way, you need the absolute best odds you can get.

After all, with the turn of a reel of faulty computer tape your company stands to lose a bundle in information.

That's why you need to put your money on Epoch 4 computer tape.

With Epoch 4 you start out way ahead of the game. One reason — every reel gets 100% certification before you get it. Another reason — Epoch 4 helps you fight lost data due to dropouts because its coating is 8,000% tougher than any other tape.

Good odds? You bet.

GRAHAM MAGNETICS
Graham, Texas 76046

Uses Key-to-Disk Devices

On-Line Disk Storage System Holds Illinois Records

SPRINGFIELD, Ill. – Can you imagine having the responsibility for licensing all the motor vehicles and drivers in Chicago?

The office of secretary of state of Illinois has the whole state to contend with plus security dealers and brokers, corporations, state archives and the maintenance of the capital complex. The office generates $378 million annually . . . and most of the records depend on an efficient DP operation.

The secretary of state's DP division is presently installing a Honeywell H6080 computer. The new system will include 5-1/2 billion bytes of on-line disk storage for Illinois' extensive, direct-access applications.

Principal among these is the Law Enforcement Automobile Detection System, an advanced verification process for law officers looking for suspended or revoked licenses. Using an in-car terminal, the officer can interrogate the remote disk files as to the validity of any registration, even interstate numbers.

Conversion Speeded

Massive system conversions normally take a year or more to implement, but this conversion has been proceeding much more rapidly – with only one or two months overlap between major benchmarks – thanks to a bevy of time-sharing and remote job entry (RJE) terminals Robert C. Olson, director of the DP operation, had installed to facilitate conversion.

The terminal network enables interactive programming and hands-on experience with the actual system the secretary's office will be receiving. Communication links are established to out of state and the in-house CPU.

Job entry and execution are performed remotely, but just as effectively as if the programmers were seated at the computer console. For large data entry jobs, Olson selected a Mohawk Data Sciences (MDS) 2400 processor with tape drive, 400 card/min reader and 380 line/min chain printer. The 2400 emulates a GERTS terminal communicating with a Honeywell mainframe operating under Gcos. This terminal is reserved for extra-long program listings and job results which require rapid turnaround and high-speed printouts.

All Resources Tapped

Olson explained that all available resources have been tapped to increase programmer productivity, and shorten the time before the benefits of the permanent system begin to emerge.

Even after the conversion period, Olson

Robert C. Olson

envisages additional applications for the programmable MDS 2400 . . . such as unit record jobs which presently require separate tab equipment. And remote job entry terminals will still be needed for ongoing system development, such as a complete driver information system currently in planning stages.

Archival storage of vehicle registrations, cancelled warrants from the comptroller's office, the Illinois Wheel Book, and other bulky state records have been committed to computer output microfilm (COM).

The operations division, managed by Jim Settles, oversees all data entry, report printing and computer resources within Olson's department. Settles improvised a system of "production controllers" – key individuals – to interface with related projects in technical support and systems programming, thus coordinating all elements of the DP operation.

Hard to Cost Justify

"It is very hard to cost justify some elements of state service," Settles said. "Sometimes, convenience outweighs costs. Registin is a good example. Because Illinois is a title state, motor vehicle owners are required to complete two forms, one for title certification and another for plate registration.

We are working on a single preprinted form to handle both title and registration issuance. The ultimate convenience and reduced cost of paperwork to the taxpayer will more than offset the original development outlays."

Presently, all 5.5 million registration renewal forms are printed on an MDS 2400 off-line print station equipped with two 1250 line/min drum printers. The printers' 1403-AN character fonts were modified slightly (letters B and D and numeral 1) to facilitate OCR scanning and for greater human readability.

Since renewals are turnaround documents, there should be minimal room for errors. For this reason, the system preprints as much of the information as practical, leaving only a few variables to be entered by the applicant. The modified font also discourages registration falsifications, because the character set cannot be duplicated on a typewriter or standard printer.

Once completed, the renewal forms are scanned on Recognition Equipment Inc. (REI) equipment. Olson established several criteria before instituting scanning for motor vehicle registrations. Right use prevents too many rejects. "First," asserted Olson, "we sought high-quality input without placing unworkable constraints on the persons supplying the input. The combination of MDS printed forms with machine-aligned variables has reduced the reject rate to a minimum. The few rejects that do occur are handled easily by a few persons using REI monitor scopes."

"Second," continued Olson, "we exercise constant vigilance through feasibility studies to discover new application areas for our shop. We cannot afford to overlook new opportunities for cost savings through technology."

Rearranging Hardware Improves Satisfaction, Data Throughput

By Patrick Ward
Of the CW Staff

SYRACUSE, N.Y. – Rearranging a data center's hardware into a more logical floor plan is a relatively low-cost way to improve throughput and boost operator and user satisfaction, according to Russell P. Milioto, data center manager for Agway, Inc.

It may even turn up ways to save on equipment rentals through better usage of peripherals, Milioto found.

Like many computer centers, Agway's had "grown like Topsy over the last few years," Milioto said.

The shop's two IBM 370/145s, 16 disk spindles from Telex and IBM, 12 tape drives, card readers and punches, printers and communications gear were crowded in everywhere around the 2,700-sq-ft center. "As we brought new equipment in, or as we changed equipment, it sort of went in where we had room for it, rather than by any particular plan," he explained.

"It was amazing how many steps an operator had to walk to do a job," Milioto remarked. "Once we saw that, we knew something had to be done."

Several Months of Study

The shop spent several months studying how it could make the data center more functional. The operations supervisor took primary responsibility for laying out the rearrangement plan, since he had been a shift supervisor and "had a good idea of what the center's working needs were," Milioto noted.

The company's DP research group also participated "so we had some idea what was coming down the pike in terms of new equipment," Milioto added.

The planners did not use miniature equipment models to study new arrangements, but sketched, evaluated and then redrafted layouts seven or eight times, Milioto explained.

An IBM physical layout specialist and Telex representatives also participated.

The rearrangement took place over Thanksgiving weekend last year. Starting on Friday night, the DP staff pulled out all the cables and stored them in a hallway. By Saturday noon, the systems were up and running, and the shop resumed normal production Monday morning.

Helps Staff Get Work Out

A visitor to the DP center now might remark on "all the space they have in this computer room," Milioto said. But more than that, the new arrangement helps the staff get the work out, he said.

The shop now has its tape drives past the CPUs at one end of the room. The 4,000-reel tape library is just behind the drives.

The card readers are located close to the side-by-side 370/145s. Next comes the disk drive area, followed by three high-speed printers arranged in a semicircle.

"Near the printers, we've located, as much as possible, the forms we're going to need over the next couple of shifts," Milioto pointed out.

The output operator working at the printers now operates the shop's only card punch. Previously, each system console operator had run his own punch, but, with the rearrangement, the shop found that two punches were unnecessary.

A burst and decollate area ends the hardware lineup.

Staff Reassigned

The shop has also reassigned its 11-member operations staff. Before the rearrangement, everyone was either a "console operator or a computer operator." Now the 11 people work as console operators, tape operators, output operators or input/output control clerks.

The control clerks' job is to check in work coming into the computer room and check it as it flows out. They perform other tasks like breaking down JCL after a job runs and working with the tape management system, Milioto observed.

"Before we had the I/O control clerks, we did considerable checking of input but very little checking of output," he said. The shop ran into problems where users would not receive their results, and the DP staff would then have to search for the documents, he said.

The console operators now run the system full time. "They no longer miss messages because they're out changing a tape or something like that," the DP center manager observed.

The tape operators spell the console operators for about a quarter of the work day. This is a good training technique for them, Milioto said.

While he said he could not quantify the effect of the rearrangement and other changes, Milioto stated "there's no question in my mind that we now have more time available to do our work."

And, "we've certainly come away with what we wanted, which was a smoother operation." User relations are also better than they have ever been before, he added.

While Milioto said he thought a logical rearrangement of any shop's hardware could bring at least temporary benefits, he stressed that the process works best when a DP manager knows exactly what he wants to do to improve his shop's operation.

Center Gets Software, Displays

SYRACUSE, N.Y. – In addition to rearranging the hardware and reassigning its people, Agway, Inc. enhanced its DP operation with outside software packages and a tape-handling aid last year.

Data Center Manager Russell P. Milioto praised Value Computing's Comput-a-Charge, a measurement and billing system that not only points out problem areas, but allows the Agway staff to analyze things like abends (abnormal ends of jobs).

Agway also uses the tape-library software, Valu-Libe, from the same firm, he said.

Last year was also the time the shop was converting from DOS to OS, and University Computing Corp.'s Duo software package was a big help here, he said.

When the shop rearranged its hardware, it also installed the volume serial number (VSN) display system from Advanced Digital Systems of Mohawk, N.Y. The displays attach on top of the tape drives and show the volume serial number of the tape reels the system needs.

The displays "just streamlined the whole operation that much more," Milioto commented.

If you think all premium computer tapes are alike, take a closer look at BASF 2000/A.D.

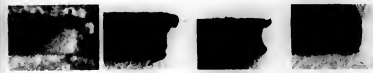
Because all premium computer tapes are 100% certified and meet industry standards, you might think they're all equal. They aren't. The important difference is the margin by which a manufacturer's standards exceed industry standards. It's this extra margin that allows no margin for errors. Let's look at a few superior points of BASF 2000/A.D. computer tape:

Debris-free edges

Rough edges and debris on tapes are the result of inferior slitting, which causes the coating to overhang the base. The projecting edges become detached by tape guides and drive rollers. The result: loss of head-to-tape contact . . . and errors. BASF has eliminated these problems with an exclusive double-cut slitting technique that keeps our tape edges perfectly debris-free.

Straight edges

Another hassle, even with premium tapes, is edge waviness. This causes intermittent reading and writing errors. Dynamic conditions during tape transport can occasionally compensate for the waviness, so it's a tough job to track down. Again, our double-cut slitting technique keeps 2000/A.D. edges absolutely straight and symmetrical.



Uniform width

Uniform tape width is essential, in order to avoid dynamic skew errors. According to industry standards, a width tolerance of ±.002" is acceptable. We peg our 2000/A.D. standard at ±.001". It's a small detail, but it could eliminate a few 3:00 a.m. debugging sessions.

Superior coating

We've developed a new "hotter oxide" coating . . . a higher energy oxide that produces an output consistently higher than that of the National Bureau of Standards reference tape. Then we apply this oxide with a unique coating technique that provides a more even dispersion of oxide particles in the binder. For any bit density, including 6250 B.P.I., 2000/A.D. gives you more reliable writing and reading . . . better bit-to-bit uniformity . . . fewer drop-ins and drop-outs. And virtually no permanent errors.

Hard surface

Head wear is inevitable, but it shouldn't be excessive. That's why we developed a finishing operation that gives 2000/A.D. a harder, smoother surface than anyone else's. It's a lot kinder to your tape head, and keeps your maintenance time to a minimum.

And in conclusion

2000/A.D. costs no more than other premium tapes. You're already paying for BASF quality . . . you might as well have it. For the whole story of how 2000/A.D. stacks up against the competition, write to BASF Systems, Crosby Drive, Bedford, Mass. 01730.

You're already paying for BASF quality, you might as well have it.

STRETCHING YOUR HARDWARE DOLLAR

MARCH 26, 1975
A COMPUTERWORLD SPECIAL REPORT

Problems?

To properly evaluate enhancements you can implement to increase the productivity of your DP installation, you must first obtain a clear perspective of what you are doing.

Take a sheet of paper. Make three columns. In the first column, list all your data sources. In the second, list all your DP application systems. In the third, list all destinations where processed data is to be utilized.

Draw a line between each input source and all the application systems it affects. Draw a line between each application system and the appropriate data destinations.

Now add numeric footnote references on the connecting lines to identify all intermediate processing steps such as input validation, sorts, master file updates, etc.

Similarly, use alphabetic footnotes to identify each place where verbal and/or written instructions are required for the personnel involved to properly enter or use the data and use the machines. Hmm. That's pretty complicated. Let's try again.

Take a sheet of paper. Make three columns. In the first, identify each data source. In the second, list each machine and each processing step. In the third, list each output destination for a printed report or data reply.

Connect appropriate items in adjacent columns with lines. Use numeric, alphabetic and Greek-letter footnotes to indicate . . . Hmmm.

Take a sheet of paper. Make three columns. In the first, list all the DP problems you have had to respond to, such as head crashes, chronically late reports, mounting the wrong tape when running the payroll, etc.

In the second column, list the possible causes, such as hardware failure or inadequacy, operational mix-up, software failure or inadequacy, etc. In the third column, list possible solutions such as a larger mainframe, more disk drives, a key-to-disk input system, better operating personnel, etc.

Connect all items that are or could be related. Number alternate paths in the order of increasing cost, turnaround time and response to requesting department. Hmmm.

Take out a map of North America. List all the geographical areas where you wouldn't mind working, in order of preference. For each area, list the companies that would like to hire somebody who is great at identifying problems, but isn't as good at finding solutions. Hmmm.

No... Solutions.

Stretching Your Hardware Dollar takes on new significance in this time of depression, recession and confused financial climate. But the emphasis in the DP environment is to more carefully evaluate alternatives and their cost performance. Indeed, alternatives to solve problems are as varied as are the individual DP centers.

Consideration must be heavily weighted as to the expertise of the staff, its willingness to take on new projects, the willingness of management to support the DP staff in exploring and testing alternatives, pay-out considerations on equipment, and the thorough considerations of potential problems both with the presently installed equipment and with new equipment.

On a more tangible basis the alternatives open to a DP center are more concise: independent peripheral suppliers, third party leasing, independent maintenance and used equipment.

Over the past several years, however, the independent peripheral firms have sustained a severe pruning and where there were dozens of alternatives open to the user, competitive pressures have cut out many of the "side line" or "undedicated" independent suppliers.

Third party leasing firms now have taken over some of the slack by combining products from independents into packaged systems at very attractive cost/performance prices . . . and the leasing firm's use of independent maintenance companies has eliminated the old problem of fingerpointing when a system crashes.

Users have also found that solving a problem is not really complicated . . . adequate alternative solutions are available for most problems. It just requires users to keep an open mind to efficient techniques, a constant seeking of how other users have tackled a problem and a simple receptiveness to the philosophy that there is always a better way to do the job as long as the new solution costs less.

On the Inside

This special report was prepared under the direction of Vic Farmer, CW's associate editor/hardware.

Short-Range Solutions Save Money Now

Improving Operations Productivity a Complex Task

By Fonnie H. Reagan Jr.
Special to Computerworld

Achieving the ultimate productivity in an environment that includes a multiplicity of steps and responsibility centers – i.e., the typical computer center environment – is a complex, time-consuming task.

Identification of the steps is not a solution. Evaluation of new hardware/software devices is not a solution if it does not include an evaluation of the impact of the new device on all areas on which it impinges.

Listening to a salesman extol the virtues of new devices/systems/concepts is not a solution if the peculiarities of your own business are not considered.

Solutions

Solutions can be divided into two groups based on how much you have to change your present operations to accommodate them. Long-range solutions may provide the ultimate in efficiency increase, but they also take the most time and resources to implement and start realizing any savings.

Short-range solutions may not represent the maximum potential increase in efficiency, but they do allow immediate savings. In the gray area separating these two distinct groups are devices and concepts that permit immediate improvements with the potential for integration into long-range plans.

Because long-range solutions depend so heavily on individual quirks in particular installations and on technological developments, this article will concentrate on short-range improvements – things that can be done now to improve operations.

Faster May Not Be Better

The productivity of a computer system can be measured in data items processed per unit of time. However, unless cost is also factored in, faster may not be better.

This can be restated into two questions: How can I get the same performance for less money? How can I get more performance for the same money?

Application systems can be divided into three major functional segments: input preparation, file processing and/or computing and output processing. Each segment can be thought of in terms of hardware, software and operations.

A typical computer center can advantageously consider each area of each segment as a potential place to achieve system improvement.

A complete discussion of each functional segment in terms of hardware, software and operations in relation to the two questions raised above would form a rather lengthy tutorial on DP. This article will be confined to an overview, creating a sort of checklist of possibilities.

Hardware improvements take the form of:

- Acquiring the same or equivalent equipment at a lower cost from a source other than the mainframe vendor.
- Acquiring hardware devices that perform some of the functions of the mainframe itself.

For the IBM user, numerous sources are available for third-party leasing of IBM components and for independent or third-party acquisition of plug-compatible disk drives, tape drives, printers, terminals and main memory (including performance accelerators).

For users of non-IBM computers, sources are few, but more are becoming available. In repeated interviews with users, Datapro has found most plug-compatible devices are viable and highly cost-effective alternatives to the mainframe vendors' own products.

Unloading the mainframe is trickier. A full-size mainframe can generally manipulate data more efficiently than a minicomputer-based auxiliary system. But that's not the whole story.

The dominant characteristic of modern operating software for the full-size system is the myriad paths through the system depending on the conditions existing during the execution of a mix of batch/real-time (background/foreground) applications systems. (The number of paths through the operating system is large enough to preclude complete testing prior to delivery. Consequently, bugs show up long after initial installation when you try something new or when a particular combination of events happens for the first time.)

Eliminates Decisions

These paths represent decisions. By reducing the number of decisions required, a gain in processing performance can be achieved. Use of a minicomputer-based auxiliary system eliminates some of the decisions because some paths are fixed.

For example, inclusion of a front-end communications processor to manage the communications network eliminates supervisory code in the mainframe to handle that overhead. Because the front end is dedicated to one task, many of the decision points evident when the mainframe was performing the communications control task do not arise.

In this fashion, you can use a device that is less efficient than the full-size mainframe to perform a task previously handled by the mainframe and still achieve a net gain in system performance.

Other functions besides network control can be removed from the mainframe. Input validation can be handled by a shared-processor key-to-disk data entry system. In addition to relieving the mainframe of the processing task, corrections can be made closer to the original source documents, yielding a substantial increase in operational efficiency.

Another variation of mainframe unloading is the use of intelligent terminals to replace "dumb" or nonprogrammable terminals.

Yet another mainframe function that can be unloaded is the control of output printing. Once the output tape-to-disk print file has been generated, an off-line printer can be used to generate the printed copies of the reports. Coming into vogue now is the inclusion of hardware and software in key-to-disk systems to perform sorting, off-line printing and even report generation from data files.

Innovative Solutions

Innovative solutions from imaginative vendors can be expected to extend the now-traditional possibilities of system performance enhancement by unloading the mainframe.

Examples available now include the Inforex System 5000, a minicomputer-based file maintenance/inquiry system, and Pazdynet's PIX, a hardwired-logic system for managing remote peripherals so the system thinks they are locally attached.

One of the advantages of using auxiliary programmable systems is the separation of the overall system into independent parts. For example, extensive changes can be made in input documents to simplify key entry while the key/disk system still cranks out the same old formatted tapes the application system has always expected.

Ways to improve the hardware cost/performance ratio can be summarized as follows:

- Acquire cheaper components and/or systems from third-party leasing firms and/or independent plug-compatible peripheral vendors.
- Use minicomputer-based auxiliary systems to remove some functions from the mainframe and reduce system management overhead.

If manpower is available to consider system enhancements, the best move will probably be to use that manpower first to clean up operations. Clear and non-ambiguous operating instructions should be written for each system and the operators trained so they really know what is going on.

Overlaying a sloppy computer center with sophisticated hardware and software systems just increases the magnitude of the problems that will occur. Making mistakes twice as fast is not a system performance enhancement.

Cleaning up operations is a desirable, but not final, task. Once it has been accomplished, maximum advantage can be taken of lower cost/equivalent-performance peripherals, equivalent-cost/higher performance peripherals and minicomputer-based auxiliary systems that eliminate some mainframe processor overhead.

Reagan is research director at Datapro Research Corp.

'Knowing the Score' on Lessors Saves Firm $100,000 Annually

WILMINGTON, Del. – When Rollins Leasing Corp., a truck-leasing firm here, wanted to change its IBM 370/135 to a 360, DP manager Charles Deale figured out a unique way to get the best price.

He started by calling only five leasing companies, firms he knew to be reliable. Then, he kept a blackboard score-chart in his office for everyone, salesmen included, to see.

Keeping score on the vendors so agitated their competitive juices, said Deale, "one guy came in here with an offer $20 under the previous best." Eventually, the five firms ended up within $100 of each other, and Rollins went with Talcott Computer Leasing Division of James Talcott, Inc. from New York City because of its reputation and other factors.

360/40 Makes Things Simpler

Rollins leased a 360/40 from Talcott to save money and to make things simpler, said Deale. "We thought IBM had a very expensive, overcomplicated approach to solving our software problems with the 370," Deale said – "We weren't properly using the 135. VS and Power were boondoggles, as far as we were concerned."

By switching to the 128K 360/40, Deale figured Rollins saves $70,000 annually. In addition, the company gets 25% more throughput from the installation and figures it would have cost $30,000 annually to get that performance level from its 370/135 – giving Rollins an effective savings of $100,000 a year.

What is more, said Deale, the system is easier to operate. The company has worked out an incentive program that rewards operators for getting jobs done right the first time.

Other Money Savers

Other money savers Rollins looked at included tape drives from Telex, which Rollins leases, and dual-density disk drives from California Computer Products, Inc. (Calcomp), which Rollins considered but rejected because of questions in availability. Instead, Deale said, Talcott supplied 2314 disk drives.

Before deciding on the 360/40, Rollins had considered going to a non-IBM CPU, but gave up the idea because of the impact it would have had on operations and personnel in the shop. Besides, said Deale, "the benchmarks on one machine we looked at were good, but the delivery schedules were horrible."

Leased 360s Bargain at 25% to 50% of IBM Rental

By Roland E. Parenteau
Special to Computerworld

The best bargains in leased computers are the same as the best bargains in used machines – the IBM 360 series, according to leasing companies recently interviewed by *Computerworld*.

Estimates of going rates (for CPUs only) vary from 25% to 50% of IBM's monthly rental fee, depending on the model of the computer and the length of the lease.

IBM peripheral equipment from third-party lessors is priced at 75% to 85% of IBM's monthly rental charge, allowing a typical user to save 60% of IBM's rate on the entire 360 system, said Mort Crandall of Computer Investors Group, Stamford, Conn.

By contrast, 370 CPUs from third-party lessors are priced at 65% to 75% of IBM's monthly rate, Crandall noted.

But the savings won't go on forever, the lessing companies said. "Prices on 360s have firmed up in the last three to five months," Jack Thuma of Boothe Computer Corp. in San Francisco said. The same trend was noted by other dealers.

Increased Downgrading From 370s

Truman Rice of Talcott Leasing in New York City attributed the firming up of 360 prices to an increased desire to downgrade from 370s. In the last quarter of 1974, many people replaced their 370s with 360s.

"In fact, 15% of those responding to our most recent survey said they wanted to downgrade their 370s," Rice said.

He said much of the downgrading trend is being caused by tightened budgets and rising salaries. "DP managers are finding out hardware costs can go down, but people costs can't. In a batch-oriented shop, a 370 can't compete with a 360 for its price/performance ratio," Rice claimed.

"A lot of people who said they couldn't do without a 370 two years ago are saying they can't keep their jobs with one now," remarked George Springspeen of Granite Computer. "People are looking for a good price/performance ratio, and they find it in the 360," according to Crandall.

Many Handle Only IBM

Bigger savings are available on peripheral equipment from non-IBM manufacturers, but many leasing companies won't deal in anything but IBM equipment.

Nevertheless, as Rice pointed out, "Any OEM supplier has to offer 40% to 50% off IBM's price if he is to remain competitive." The most common use of independent peripherals is for extra memory, Rice said. "More real memory is needed to handle the overhead of VS in the IBM 370 system."

Attractive Packages

The independent suppliers themselves, however, can offer attractive packages. Genesis I Corp., New York, for example, offers a replacement for IBM's 3270 terminal for $100/mo – a saving of $35/mo per machine. Itel Corp., which leases packages of IBM CPUs and its own peripherals, offers package prices at 50% of IBM's cost for similar configurations, according to spokesman Dick Whitcomb.

Third-party leases on non-IBM CPUs are much harder to come by. Rice says Talcott Leasing will handle a non-IBM machine, but only on a full-payout basis.

Other leasing companies interviewed said they did no non-IBM business at all, or only some dealing in peripheral equipment "to accommodate a customer," said Thuma.

Residual value of the machine is the major factor for policy in this area, Thuma said, and Rice added, "IBM's 360 was a good, general-purpose computer, and it sold billions of dollars worth of them.

"Leasing companies know they'll always have a market for it. IBM issued a policy letter in December that indicated it intends to maintain 360s for many, many years to come."

Asked what protections there are for an end user against late shipments or faulty equipment, the dealers interviewed unanimously responded, "The best protection is doing business with a reputable firm."

The second best means of protection is to spell the agreement out carefully by asking for dates of expected shipment and delivery, serial numbers of equipment and fixed penalties for late delivery, either in cash or in computer time on a similar system, Rice noted.

But "users should remember time agreements are a two-way street; users have to be ready to accept delivery," he added.

"You run into trouble when you deal with somebody who is not an equipment owner. A broker runs no risk if he offers you a deal on a computer he thinks he can get," George Springspeen of Granite warned users.

Also, "most leasing agreements don't cover maintenance and taxes – a user will have to find his own maintenance, subject to the approval of the lessor, Rice said. This could present a problem for users seeking maintenance from independent third parties.

Utility Firm Doubles Throughput

Third-Party 360 Eases 'Growing Pains'

Special to Computerworld

JENKINTOWN, Pa. – "If someone had told me three months ago we could increase our computer throughput by 100% in 1975, yet still be living with our 1974 budget, I'd say he was really oversetting," said Richard Stefanowicz, office manager at Asplundh Tree Expert Company.

"We find this hard to believe – but it's true; it's happened in our installation."

Asplundh, a nationwide company of 8,000 employees serving the utilities industry for the past 47 years, upgraded to a 128K IBM 360/40 with a ninepack a year and two years ago. By mid-1974, Asplundh was running three shifts five days a week and wondering what it should do next to accommodate future growth.

"We wanted the flexibility to add 20 or more data terminals and expand several applications," Stefanowicz explained. "There seemed to be no solution at that time other than making a large incremental hike in the budget.

"Money can buy you any throughput you want – if you can afford it – but we're in business to make a profit, not to increase expenditures, so we looked at our alternatives."

During late 1974, Asplundh reviewed the feasibility of upgrading to an IBM 360/50 or 370. IBM proposed a Model 125 with its 3330 disk drives; Randolph Computer Co., on the other hand, submitted a plan to install a 256K Model 50 and six RCC/7330s, Randolph's plug-to-plug disk replacement for IBM's 3330.

360/50 Outperforms 370

According to Brian Flack, Asplundh's DP manager, benchmark runs revealed how well the 360/50 would outperform the 370 – and for a lot less money.

"We used a typical application for our benchmarking – one which required a lot of disk operations. We felt this would be a good indicator of a system's performance," said Flack.

"On our installed 40 configuration with the 2314 attached, the job required 16 minutes to complete. IBM came in and benchmarked on their dedicated 370/125 with 3330s and no paging activity, and the job ran in 14 minutes. The 50 then really started to look better. After the 50 was installed over a weekend, the 2314 was attached; the same job ran in 12 minutes."

"I was concerned," Flack admitted. "We made the decision to upgrade with the 360, and now I was getting a throughput of only about 10% over 370; I had been hoping for a bit more. But I realized I was disk I/O-bound."

Several weeks later, Randolph's six disk drives were installed, replacing the 2314. During the shakedown week the true performance potential of the system began to emerge.

"I found it difficult to believe at first," said Flack. "I ran the benchmark again, this time with the Randolph 7330s installed, and the job ran in seven minutes – half the time of the 370 configuration. It now runs in background in that same time while running two foreground partitions.

Typical Improvements

Such improvements in throughput are typical of most of most of Asplundh's applications. Now, instead of three full shifts, they run two – and the second shift is underutilized.

"Now we have the room we need for our expansion plans – and it hasn't cost us anything," said Stefanowicz.

Conversion from the 2314 to the 7330s was straightforward with IBM's "Disk De-

(Continued on Page S/5)

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WHITLOW COMPUTER SYSTEMS Inc. 222 S. Marginal Road, Fort Lee, New Jersey 07024

Low-Cost Alternative in Mixed-Vendor Shop

Single-Source Maintenance Avoids Finger Pointing

By Patrick Ward
Of the CW Staff

NEWTON, Mass. — When users decide to order a mix of equipment from different vendors to obtain the best performance for their money, they open the door to the "finger-pointing" problems of mixed-vendor shops.

One way around that is to contract for service from a third-party vendor who can, hopefully, provide single-source service — and at a lower overall cost as well.

A variety of these firms exists. Some specialize in minicomputers and terminals. Others concentrate on IBM 360 shops and plug-compatible peripherals. A smaller number service Honeywell and Univac gear.

While most of the third-party service vendors *Computerworld* interviewed recently said they can provide less expensive maintenance, most also admitted they can't always provide single-source service. Many manufacturers don't want them to and make it difficult for the third-party service firms to obtain parts, they said.

When writing a contract with an equipment supplier, a user might insert a clause to guarantee his rights to third-party maintenance in case he should later want it, noted Joseph Colyar, regional field engineering manager for Computer Hardware Consultants and Services, Inc, (CHCS) of Newtowne, Pa.

IBM Parts Obtained Easily

However, the maintenance vendors said they can obtain IBM parts as easily as if they were IBM customer engineers.

Comma Corp. of Minneapolis, Minn., like most of the maintenance firms, specializes in the small shop with a purchased IBM 360 and either IBM or plug-compatible peripherals, said Donald D. Raby, vice-president of marketing.

"We can do problem determination for the entire shop, and our pricing structure is better than IBM's for service people as good or better than theirs," he said.

Comma Corp. operates at 85% of IBM's price in servicing both 360 and 370 equipment, Raby said.

Comma is beginning to service the IBM 370 CPUs, "but that area is more difficult due to the posture IBM has taken toward . . . diagnostics and their documentation, and the availability of Retain 370," he said.

Retain 370, an IBM maintenance data base, "is starting to be meaningful now," Raby said. Other third-party maintenance firms, however, didn't seem especially interested in using the diagnostic service.

Though a single-source service agreement has a lot of appeal to users, it's not practical for many user shops, he said.

Certain peripheral makers, for instance, take a hard line on maintaining their own equipment, he noted.

While the IBM consent decree allows easy access to parts, Raby said, getting parts from other mainframers is a much more complicated business. The result is that the third-party maintenance firm must carry an expensive parts inventory for these particular vendors and that is why the major maintenance firms tend to concentrate on IBM CPUs, he said.

However, Comma does maintain some Univac and Digital Equipment Corp. gear, espbcially when the latter is used in front-end processors, he said.

In general, Comma concentrates on maintaining CPUs rather than remote terminal systems, Raby noted.

Also Focuses on IBM Market

Sorbus, Inc. of King of Prussia, Pa., also focuses on the IBM market because of parts availability, said Vice-President of Marketing Robert C. Leonard.

"We also service a great number of minicomputers, batch terminals and IBM 3270 and 2260 replacement terminals," Leonard said.

Sorbus does maintain IBM 370 system peripherals, but not the mainframes themselves.

Sorbus also services point-of-sale (POS) terminals working under parts support contracts with the manufacturer and with individual service contracts with the end user.

The Sorbus vice-president agreed that, while the one-service-source idea is appealing, "in many cases we can't do it."

"But that involves no more than 10% to 15% of the sites Sorbus is servicing," he said.

Raytheon Service Co. maintains mixed-vendor IBM 360s and 370s and Honeywell CPU usern plus minicomputers and network terminals, said Michael G. Salter, the firm's commercial marketing manager.

Raytheon also offers primary field maintenance; equipment installation and deinstallation; engineering support, documentation and training; facilities operation and management; equipment over-

(Continued on Page S/8)

Third-Party 360/50 Eases 'Growing Pains'

(Continued from Page S/3)

vice Independence" software rented for $50/mo. With this package, referred to as ALK, Asplundh made the conversion in two weeks and had no problems.

"Even our disk pack requirement has been reduced from 60 to 16 packs," said Flack. "Not only do we save several hundred dollars each month in pack lease costs, but we've also virtually eliminated our pack storage and data security problems because we can easily control the whereabouts of these 16 packs."

Before the 7330s were installed, Asplundh's computer operators were always busy changing disk packs. Now the 100M-bytes packs reduce pack changing considerably.

"Our jobs are the standard accounting applications," said Flack. "Also, we run equipment control reporting to monitor our large network of vehicles coast to coast, as well as our manufacturing inventory. Payroll, understandably, is a particularly critical application which we must process in two days and mail to all employees weekly. Timing is especially critical due to the problems involved with mailing coast to coast."

"We also have new applications in the development stage," said Stefanowicz. One major area involves attaching local CRT terminals to speed up data base updating.

Problems Not Insurmountable

Rethinking Application Programs Key to VS Success

By John J. Hunter
Special to Computerworld

The concept of virtual storage (VS) has been kicking around the industry since 1959, when the British used it with their Atlas computer. During the '60s, both Burroughs and the late RCA DP groups worked on refining the concept, only to see it finish second in a good many marketing battles.

Then, in the summer of '72, VS finally became a bride.

IBM's recognition of VS also brought with it the resurrection of two marketing claims: convenience and increased throughput. VS was supposed to be more convenient because it allowed users to ignore the limits of real memory and to write programs to the logical limit of the system's addressing structure – in this case, 16M bytes on the System/370.

And, since the programmer no longer had to worry about fitting programs into the confines of a core region or partition, he could concentrate on making his application more efficient. Now that's real convenience!

Throughput would be increased because more jobs could be running simultaneously now that the availability of main memory was less of a problem. All a user had to do was carve up real storage into small areas, declare large VS areas on a disk or drum and bingo – he was running more and larger programs than ever before. Now that's real throughput!

Both claims are absolutely true. There was no marketing flimflam, as some people have charged. So why are users having trouble with VS? Don't they fully understand how to use it? Did they expect too much from VS? Have they been getting bad advice? It's all of these.

A Miracle?

Many users believed (or were led to believe) they could merely take their existing applications, recompile them, load up the system and sit back and witness a miracle. They found too soon they were not sitting, but jumping up and down, and what they were witnessing was a nightmare. To their consternation, they found applications were taking longer to run, resources were being wasted and their high-priced CPUs were doing less and less productive work.

It didn't take long to find the cause: Programs don't run the same way under VS as they do on nonpaging machines. Instead of simply overlaying a large program segment when data had to be read in, as is the case with the nonpaging systems, the virtual machine and/or its operating system may perform as many as 19 additional operations each time an instruction is executed.

As one might imagine, performing all these tests takes lots of time – and it's all overhead. Then there is that other processing degrader we've all been hearing about: excessive paging.

Possible Solutions

A number of solutions have been offered to cure the ills of VS degradation; some deal with changing hardware, while others advocate altering software.

The principal cause of degradation under VS comes from page swapping. Swapping occurs when a page of code is not in main storage when needed, and the system must halt processing to perform an I/O to find and retrieve it from VS.

If the processing jobs are heavily I/O bound – which is the case with most commercial applications – this almost constant paging degrades processing efficiency, at best, or forces the CPU into a condition called "thrashing," whereby no processing is done because the system is preoccupied with performing I/Os.

Some industry experts feel the paging problem is insurmountable and, therefore, advocate buying the next more powerful processor in the line to compensate for lost processing time. By "pouring on the power," they reason, a user may stay even. Of course, the user might have a hard time convincing management that spending all that money just to stay even is sound thinking, let alone sound economics.

Others advocate upgrading current hardware by adding more and faster channels, more main storage and faster disks and drums. Such upgrades, however, only alleviate the problem, not solve it.

Still other experts feel the paging problem with its accompanying degradation can only be solved by going to the root, the application programs themselves. This, in our opinion, is the soundest and, in the long run, the least expensive solution available.

The advocates of hardware upgrading do, on the surface, have a pretty good case. By adding more main storage, it's possible to keep more pages resident, thus reducing the number of paging operations between real and virtual storage.

If, for example, you expand from 96K to 128K bytes (a 30% increase in core capacity), you can expect about a one-third reduction in paging – providing you are not near a state of thrashing and the job mix remains constant. That's not a bad percentage overall, but even in this idealistic situation, it's not good enough to justify the expense.

Adding more and faster channels will increase overall efficiency by decreasing the possibility of data transfer bottlenecks. Such bottlenecks occur when competing I/Os request information from different storage devices connected to the same channel.

Adding channels provides alternate data paths; faster channels allow a more rapid transfer of data and thus free up the channel sooner. In either case, page transfer rates should be increased, as should overall processing efficiency.

Performance Improvement

Before you commit yourself to more or faster channels, however, remember the actual amount of program data transferred is only a fraction of the required program data due to other I/O requirements. Therefore, you will have to perform some measurements to determine the percentage of housekeeping data vs. program data being transferred.

Then you can determine your percentage of performance improvement. If this proves to be less than 20%, you might not be able to sell management on spending more money for such a marginal improvement.

The third hardware upgrade involves

(Continued on Page S/7)

Release 2 Facilities Increase Operating Efficiency

By John J. Hunter
Special to Computerworld

Of the facilities offered by IBM's OS/VS2 Release 2 – or Multiple Virtual Storage (MVS) if you prefer – the most important to a majority of users with those concerned with improving operating efficiencies. The top five VS "pain relievers" are job queue data splitting, data set allocation, device allocation, virtual I/O and System Resources Manager (SRM).

Prior to Release 2, the SYS1. SYSJOBQE data set stored all job descriptive information. This included both jobs awaiting execution and those ready to be output to printers, etc. This stored information falls into two categories: interregion data and intraregion data.

Interregion data communicates with scheduling components in different regions of the system. This data, under Release 2, is consolidated into one Hasp-ASP-JES-like job queue.

Intraregion data is used to schedule a job and communicate between the scheduler and data management routines. This, obviously, is high-usage data and can result in some major bottlenecks as different jobs compete for services.

With Release 2, the intraregion information associated with each job is placed in a separate VS area called the scheduler work area (SWA). Each job has its own SWA, and all can be accessed in parallel through the paging mechanism.

Data Set, Device Allocation Changed

The data set and device allocation facilities have also been changed with Release 2. Previously, devices, space-on devices and data sets were handled serially, and only one device at a time could be appropriated.

If a device wasn't available when requested, the system halted all allocations until the request was satisfied. Aside from causing bottlenecks, the delays caused by serial distribution could be quite large.

Release 2 solves most, but not all, of these problems. Allocation of data sets on permanently mounted DASDs are not serialized, and serialization of volume mounting has been eliminated – except when the area reserved for temporary data sets on permanently mounted volumes runs out.

Serialization of device allocation still occurs at the device level. For example, a request for two 3330s can't be handled in parallel, but a request for a 3330 and a 2314 can. Likewise, a request for a tape and disk will also be handled in parallel.

One of the greatest efficiency boosts to VS will come from Release 2's virtual I/O facility. Virtual I/O eliminates a good deal of excess paging by keeping frequently used data sets main storage resident.

The selection of these pages is handled by the operating system, as is the allocation of page space to hold them. Sequential, partitioned, Bsam, Qsam, Bpam and Bdam access methods support virtual I/O. EXCP does also.

By far, the glamour feature of Release 2 is the SRM, a subcomponent designed to monitor processing and dynamically change the job mix and redistribute resources to attain optimum efficiency. It accomplishes this through a series of algorithms which employ *user-specified parameters* as guidelines.

IBM stated one of the design objectives of Release 2 was to provide the installation manager with greater control over the turnaround times of batch jobs and response times of Time-Sharing Option (TSO) commands without writing their own scheduling algorithms.

The installation manager merely specifies the system response and turnaround time objectives by indicating the rate at which processing resources are to be provided. That's quite an assignment!

Guided by these objectives, the SRM work load manager distributes resources and continually monitors the use of CPU, main storage and I/O facilities.

If a mix proves incompatible with optimum resource utilization and high throughput, SRM can swap out lower priority jobs.

The rate at which a transaction uses resources is called the service rate and is measured in service unit/sec. A service unit is calculated based on the usage of CPU units plus I/O units plus main storage unit.

A CPU unit equals the task time accumulated since the start of the time interval divided by the time required to execute 10,000 instructions. I/O units are the number of EXCPs counted by the system measurement functions (SMF) for all data sets allocated during the time interval. Main storage equals the number of real page frames allocated to a transaction for a time interval times the accumulated CPU units.

(Continued on Page S/8)

Rethinking Programs Key to VS Success

(Continued from Page S/6)

replacing slower page swapping disks or drums with faster units. A fast device is one with low seek and latency times. For example, an IBM 2314/2319 disk has a 60-msec seek and 12.5-msec latency.

Thus, the average access time to a page is 72.5 msec. An IBM 3330 disk, on the other hand, has only a 30-msec seek and 8.3-msec latency; average access time for this device is 38.3-msec. In addition, another 5 msec are required to transfer a 4K page from a 3330 disk over a high-speed, high-capacity (800 K byte) channel, provided it's not busy when the user is ready to transfer.

Unquestionably, hardware upgrades can be beneficial in certain operating environments, particularly if you marry fast channels with fast disks or drums. But, as I said, it only alleviates the problem because it doesn't attack the cause.

The 'Working Set'

One of the big selling points of VS is that existing application programs can run with no modifications. This is certainly true. They run alright, but in most cases they also degrade system performance because they do not take into account the operational characteristics of paged VS systems.

Under VS as implemented by IBM, the system divides programs into 2K or 4K pages, depending upon the OS being used. During this process, no attempt is made to optimize code for better operating efficiency under VS.

When we speak of operating efficiency, we're talking about isolating the code which does most of the work. This is the "working set" and is the core of the program. In most application programs, only about 20% of the code accounts for 80% of the processing time (this is called the 80-20 rule).

By isolating the working set, one could

(Continued on Page S/17)

Third-Party Service Ends Finger Pointing

(Continued from Page S/5)

haul and repair; and network maintenance management, he said.

The firm's aim is to be "that single-source guy" in a mixed-vendor environment, Salter said. Single-source service is practical, he said, if the maintenance firm is careful, meaning if it stocks in the right parts and provides good turnaround, documentation, diagnostics and training.

Leverage?

The parts availability question can also depend on whether the end user can put the leverage on his equipment vendors to make parts available to his maintenance firm, Salter said.

Raytheon aims to offer mixed-vendor users single-source maintenance with a higher level of service than the user would get from his multiple vendors and for a lower cost, Salter said.

"Normally, we'll save the user in a mixed-vendor environment up to 30% in maintenance costs," based on lower fixed-price plus per-call rates, he said.

CHCS also provides IBM 360-oriented maintenance service and is "getting into" 370 CPU service, Colyar said. Most of the company's business is in mixed-vendor shops.

"We'll also maintain non-IBM display terminals on a local basis; we're in Chicago, Los Angeles and Toronto," Colyar said.

Maintains Only Minis

If an end user is large and has his own stock of parts, it's feasible for a third-party maintenance firm to be his sole-service supplier, said Jerry Dunleavy, eastern regional marketing manager for data services for Syntonic Technology, Inc. of Pennsauken, N.J.

It is harder with a smaller firm, because the task of obtaining parts and other logistics is up to the maintenance firm, he said.

Unlike the other firms, Syntonic maintains only minicomputers and their peripherals and terminals, especially remote job entry (RJE) devices.

"Our particular selling point is that we are more attuned to . . . readily handle minicomputer systems outside the large metropolitan areas," he said.

Developing Interface Standards

Dunleavy noted that the Ansi X3 T91 subcommittee is developing common interface standards between minicomputer peripherals and controllers.

Enforcing such standards would help maintenance firms, he said, since a service firm could just unplug a peripheral, replace it with another and fix the first unit off-line.

Indesery, a cooperative group of regional service companies, also concentrates on the sophisticated minicomputer user with mixed peripherals, rather than IBM 360/370 users.

Indesery maintains POS systems, front-end processors, distributed processing-type equipment and any kind of remote terminals, said William J. Herbert, director of marketing.

Combine of Companies

Headquartered in Concord, Mass., Indesery is a combine of independent regional service companies throughout the country which provides nationwide or local coverage under one contract, one pricing arrangement and one bill, Herbert said.

Besides general field maintenance, the association handles bench repair of components and modules, new installations and equipment moves, field changes and service in location, collating, shipping and inventorying spare parts.

The association also provides programmed training in maintenance theory and practice.

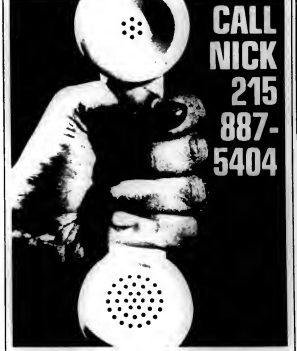
User Operating Efficiency Up With Release 2

(Continued from Page S/7)

The installation manager, when specifying the processing resources to be assigned to a transaction, is essentially determining the service rate. The rate at which service units are used by the transaction is its absorption rate. The work load manager is free to swap a transaction in and out as long as it receives its specified service rate.

In summary, SRM appears to have the facilities to provide the ideal balance of good resource utilization and high throughput.

Hunter is the software project editor for Auerbach Computer Technology Reports.



TALCOTT 360 SYSTEMS CAN BE BEAUTIFUL

THE CONCEPT

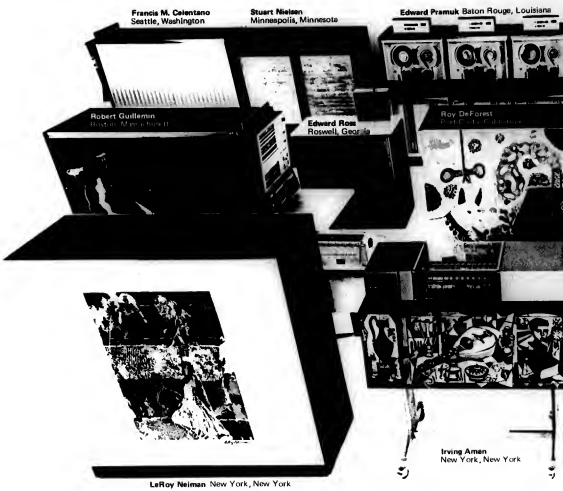
"If you've seen one computer room, you've seen them all."

That's not true anymore, thanks to 14 American Artists. James Talcott, Inc. commissioned these artists in an effort to help bring art through the doors of business and into the working environment.

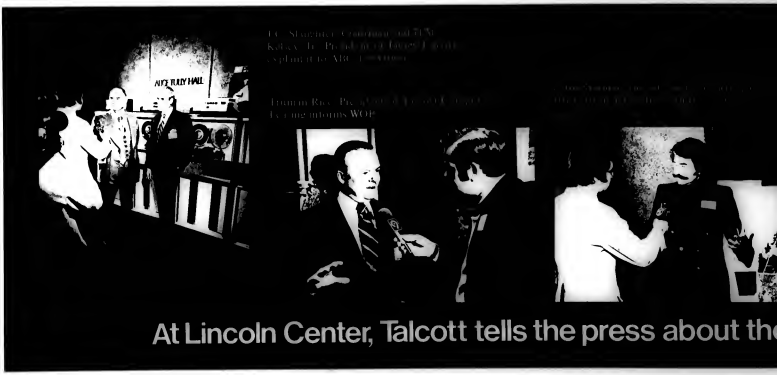
While there has been great progress in bringing art to the people, Talcott believes there has been little or nothing done in a very vital area. The area where most of us spend most of our waking hours and nearly half our lives — the working environment.

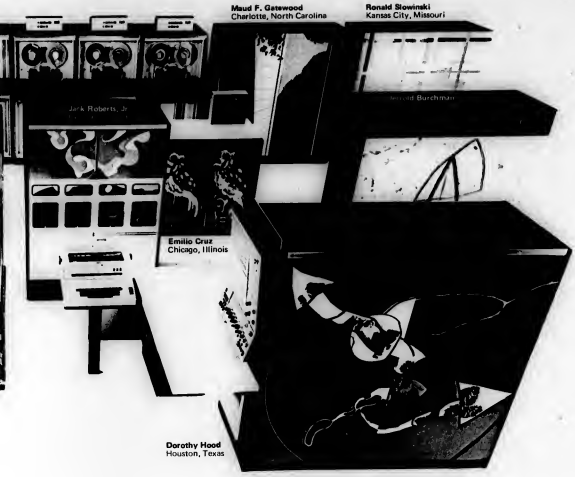
Talcott sees no reason why art should stop at the door of business. What we do see is an opportunity to bring art to where most of the people are, most of the time. We believe it will make people happier. And it might even result in better work.

As a first step, Talcott has directed its efforts toward the computer environment. With the advice of major museums, we identified 14 talented artists from across the country and commissioned them to create works for the computer environment. Pictured here are the results of their efforts.



BEAUTIFUL





FOR PEOPLE

THE PROGRAM

Companies that lease or renew leases from Talcott for central processing systems will have the opportunity to select any of the program's participating artists (identified in the color photograph) to create signed original paintings on their equipment. There will be no additional charge for this service. Companies who fulfill the terms of their lease become sole owners of the works of art.

It is our hope that this emergence of art in the computer environment will encourage businessmen to take a new look at their data processing operations, and view the computer paintings as a first step in humanizing their businesses.

Obviously the ultimate scope and direction of Talcott's program depends to a great extent upon your response.

Hopefully our efforts will lead to wider programs. Maybe even into designing entire working environments. Talcott is looking into these possibilities.

But for now, our initial program is a simple one. One we hope will interest you. Not for business' sake. Not for art's sake. But for people's sake.

e newest look in computer leasing in over a decade.

BEAUTIFUL FOR PROFIT

Even more compelling reasons for leasing from Talcott are the savings shown in the chart below. It compares rates for an IBM 360/40 in a 256K configuration with a 2314 disk, an Input/Output control unit, a line printer and a card/read punch.

The Talcott monthly lease rates quoted here include "all-risk" insurance for the duration of the lease and permit unlimited system usage.

For other configurations, similar savings result.

Lease term	Monthly charge		Total term of contract charges		Contract savings Talcott vs. IBM MAC
	IBM MAC	Talcott*	IBM MAC	Talcott*	
1 yr.	$21,100	$9,470	$253,200	$113,640	$139,560
2 yrs.	$21,100	$8,770	$506,400	$210,480	$295,920
3 yrs.	$21,000	$8,070	$759,600	$290,520	$469,080

*Including minimum monthly maintenance charges.

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New York, New York 10019

Gentlemen:

☐ I'd like to participate in this program now. Have a Talcott representative call me.

☐ I can't participate now but have a Talcott representative contact me in the month of

☐ I can't participate but would suggest you contact:

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Title
Company
Address
City State
Zip Telephone

Your Name Title
Company Address
City State Zip
Telephone

Dealers Say

Used Equipment Mart Active in Penny-Pinching '70s

By Roland E. Parenteau
Special to Computerworld

Booming computer industry growth in the '60s followed by penny-pinching economic necessities in the '70s have created an active market in used computers.

Executives and DP managers alike are looking for ways to "stretch their hardware dollar" in the area of computer equipment.

Where are the biggest bargains in used computers today? Are there problems working out maintenance agreements? What about the used computer transaction itself – who should take responsibility for transportation and insurance? How much does a broker charge?

The biggest bargains in used computers now lie in the IBM 360 line, according to most used computer dealers. They reported used 360 CPUs are going for about 20% (and sometimes less) of their original cost from IBM. And users can obtain a 360 for less than a 370 without sacrificing performance, dealers insist.

Norm Burger of Corporate Computers, Inc., a Greenwich, Conn. firm, said software enhancements can "make a 360 run faster than a 370 at far lower cost." He pointed out, at present market prices, a user could replace a 370/125 with a used 360/40 at a savings of $36,000 a year.

Any 360 CPU a Bargain

Svend Hartmann of Time Brokers, Inc. (TBI) in Chattaqua, N.Y. said users who are not concerned with the more sophisticated uses of the 370s are better off with an IBM 360.

"Any CPU in the 360 line is a bargain compared with a 370," insisted Hartmann. "If you use a 370 the same as a 360, you're wasting your money."

Hartmann illustrated his point with his claim that used 360 prices have dropped about 20% relative to the original IBM price in the past year. Hartmann expects this rapid price drop to come to a halt in 1975.

"The firming up of 360 prices has already occurred for the more powerful CPUs (360/65 and 360/50). Lately, the market for 360/40s has also picked up, and in all these categories the oversupply of CPUs has largely disappeared."

Although the 360 surplus may be drying up, Hartmann expects more 370s to become available on the used market. "It isn't a question of users reverting to 360s from 370s, but a gradual process of replacement that will put more older 370s onto the market in the coming months," said Hartmann.

For peripheral equipment, the dealers claimed, the bargains are just as great. But here the price/performance consideration enters the picture.

"One or two thousand dollars can get you a unit if you can get by with 800 bit/in. tapes or older, slower disk drives, said George Heilborn of IPS Computer Marketing, Englewood Cliffs, N.J. "Entire tape systems can be put in for $15,000 if you can use 800 bit/in. tapes."

But Heilborn warned about such economizing. "As an example, the price/performance ratio for 2311 disk drives is so low that used 2314 drives are a better buy at $45,000 to $50,000. The price of a used 2311 is $1,500," said Heilborn.

What about maintenance? Aren't computer companies wary of extending maintenance agreements to second users? Does this pose a problem for potential used computer buyers?

"No," replied the used computer dealers, "not if they are buying IBM equipment."

"IBM stands behind its machines," according to Hartmann. "Given some safeguards for transportation and installation, used IBM computers are still covered to second and subsequent users by an IBM maintenance agreement," Norm Burger added.

By contrast, John Allen of the Oliver-Allen Corp. in Sausalito, Calif. said other manufacturers "try to control the used market by making it difficult to obtain maintenance." Hartmann agreed, saying other manufacturers see used equipment as "obstacles to new equipment sales."

The result, predictably, is that IBM machines dominate the used computer field even more than they do the new machine one. "Many dealers won't handle anything but IBM," said Hartmann, because maintenance agreements with other manufacturers are too difficult to work out – or too expensive.

Heilborn pointed out, though, substantial savings are available to an end user if the user is "big or skillful enough to negotiate a maintenance agreement or is capable of doing his own maintenance anyway."

Adolph Monosson of the American Used Computer Corp. in Boston observed that "most people who buy used equipment are a couple of notches up in sophistication," affecting both the speed with which a new system gets operating and the ease with which the user can buy new systems.

Allen admitted maintenance agreements are difficult to work out with manufacturers other than IBM (Oliver-Allen specializes in used Honeywell equipment). But, he said, the disadvantages work two ways. For example, used Honeywell 1200 CPUs are available at 5% to 20% less than their original cost, but maintenance difficulties make used computer deals outside of the IBM fold expensive.

Nevertheless, if a user can do his own maintenance (keeping in mind he'll still have to get parts from the manufacturer), he can still save money, Allen said.

Used Computer Transactions

Computer dealers charge between 5% and 20% of computer value to "broker" a used computer transaction (transfer a computer from one installation to another without taking it into inventory),

(Continued on Page S/14)

Price/Performance Ratio Cited As Motive In Buying Used 360s

By Roland E. Parenteau
Special to Computerworld

A better price/performance ratio is the major reason some end users are buying used IBM 360s, according to DP managers interviewed by *Computerworld*.

Two managers also noted the ease of obtaining maintenance from IBM and another claimed to have an increased flexibility through the use of a number of used smaller machines.

When Rensselaer Polytechnic Institute (RPI) needed a bigger computer than the 360/50 it had, it first considered buying a 370/158 from IBM.

DP Director Jim Moss said it decided to purchase a used 360/67, however, because "we found we could get two-thirds of the computing power of the 158 at one-third of the capital outlay."

What is more, Moss said, he considered the longer effective lifetime of a new 158 and the possible obsolescence of that machine once IBM's Future System comes out in the next few years. He opted for the more economical used machine.

Stretching Dollars

Moss said RPI's dollar stretching extended to more than buying a used CPU: he said it has made good use of 3330-equivalent equipment from non-IBM manufacturers and of Electronics Memories & Magnetics Corp. (EMM) memory, pointing to both of these as "good ways to stretch dollars."

RPI had priced over 70 different procurements, Moss said, including alternate financing methods, before deciding to get the 360/67.

That decision was aided by the willingness of the original owners of the 360/67, Rutgers University, to allow RPI to run benchmarks on the 360/67 before installing it, lowering RPI's downtime for installation. The switch in computers, Moss said, took exactly three weeks from the shutoff of the original machine to full operation.

Moss gave the following advice to would-be buyers of used equipment: get all points of the contract down clearly, especially responsibility for preinstallation preparation, packing, shipping and delivery; and beware of brokers who offer machines they don't have.

When RPI first advertised for a used machine in CW, Moss noted, it received 65 responses to its ad. "Only one was from an original owner," said Moss, "but the rest were from brokers, some offering us more than one machine and several offering us bids on the same machine."

Central Life Reconsiders

While RPI was considering its switch in machines, Central Life Insurance of Des Moines, Iowa, was finding its 360/40 inadequate for its volume of work. The company went as far as ordering a 370/135 from IBM, said D.T. Doan, senior vice-president, but reconsidered because "we felt there wasn't enough additional throughput to justify a move to the

(Continued on Page S/15)

Second-Hand Market Active, Dealers Say

(Continued from Page S/13)

according to the dealers interviewed.

The percentage charged varies inversely with the size of the package being transferred; an entire 360 installation might be transferred for 5%, while an I/O set or tape unit transfer would be charged 20% or higher, the dealers said.

What protections are there for a used computer buyer?

"A buyer's best protection is doing business with a reputable firm," Heilborn said.

Allen would include, as a precaution, that "anyone who would buy or sell a used computer make sure the machine is up to 'current engineering level' [the level at which the manufacturer maintains the machine] and obtain letters from the manufacturer certifying the machine has been maintained and it will continue to maintain it in future."

Allen recommended prospective sellers of non-IBM machines anticipate the sale at least six months in advance.

When buying a used computer from a dealer, Monoson said, "every item in the contract is negotiable." A typical contract, according to one buyer, makes the seller responsible for transportation, delivery and insurance costs (these are, of course, passed on to the buyer, but they are the seller's headache).

Still, Heilborn said, a buyer should be sure to "go over all points clearly with the dealer you're working with."

Specially Designed Forms Lower Costs, Save Hassle

By Vic Farmer
Of the CW Staff

Although most users' output is through relatively simple fanfolded forms, some users have found their output can cut direct costs in other departments with little extra effort.

Specially designed forms and equipment can save much of the hassle, given a little advanced planning.

Two users – Danners, Inc. (a discount, variety and restaurant chain headquartered in Indianapolis, Ind.) and the Power Products Division of Desa Industries (a chain saw manufacturer in Park Forest, Ill.) -- are cases in point.

Pressure-Sensitive Labels

Steve Ogle, Danners' director of DP, in conjunction with Monarch Marking Systems, Dayton, Ohio, recently designed an output form for his company that incorporates strips of pressure-sensitive labels on a continuous form.

The labels are peeled off the printout and applied to a shipping carton of merchandise, carrying all the vital information from the bulky order invoice so it can be read through all the steps from picking through receiving and store marking.

Information carried on the 3-in. by 2-15/16-in label includes: store number, picking location, vendor identification number, Danners' own DP number, quantity shipped, correction for quantity shipped, label count, date, item description, cost code and retail price.

In addition, the upper portion of the labels are color coded to correspond with the three types of merchandise carried in the Danners warehouse.

The label has alleviated problems at both the warehouse and store level, according to Ogle. Picking time has been reduced because the labels are printed in picking sequences and bundled by store and this also reduces the possibility of delivering merchandise to the wrong store.

Inventory control is maintained by returning unused labels to DP so a corrected invoice and credit adjustment can be issued.

Time is saved distributing merchandise at the store level because the first two digits of the Danners DP number indicate the specific department number.

Another big advantage is the correction box, Ogle noted. Here, the picker indicates the quantity shipped if different from what was ordered. And the item-description area has provided Danners with added flexibility as far as their sale merchandise is concerned. "We put an additional sale description on these items so the store manager will be alerted," Ogle explained.

Since Danners has both discount and variety outlets, the selling price is determined by the type of store. Each label has an alphabetical cost code and the retail price, so merchandise can be price marked at the store level directly from the carton. This had become a big advantage with the increase in retail price changes, Ogle added.

"This is because our warehouse price book changes are usually two to three weeks behind the cost increase and resulting retail increase," he added.

Power Products, on the other hand, has approached just about the same application, but, instead of labels, this company glues (tabs on) a small stencil to the printout. The stencil is later used in the stock and shipping departments.

Affixed to continuous-form shipping orders, the tab-on stencils are cut with data at the same time the shipping orders are processed on a computer printer.

Previously, the division contracted with an outside firm which manually affixed or tabbed stencils on continuous-form shipping orders, but this was expensive.

To reduce costs while improving operations, the division installed a Model 300 Tabber produced by Weber Marking Systems, Inc. Automatically operating at the rate of 2,000/hour this unit is now used to internally tab stencils on shipping orders, according to Nick Del Giudice, DP

(Continued on Page S/17)

Plain stencil paper in roll form is simultaneously fed to tabbing plate of Weber Model 300 tabber at Desa Industries.

Used 360 Purchases Motivated by Price

(Continued from Page S/14)

370/135."

Looking into the price of a used 360/50, it found the cost of a 135 for one year could amortize the entire purchase of the used machine. Central Life finally bought RPI's 360/50 from a broker, offering its 360/40 as a trade-in.

Despite his company's canceling the order for the 135, Doan said the service it received from IBM in installing the "new" used machine was more than satisfactory. "Both the sellers and IBM put in a lot of time to get us running. The seller flew in experts to solve some core problems that had been particularly plaguing us," Doan remarked.

Central Life, with a staff of 13 programmer/analysts, got the 360/50 debugged and in full operation two weeks after delivery, all the while keeping the 360/40 on hand before trading it in. Said Doan of his company's used computer purchase, "We'd do it again."

Working with smaller machines, Reynolds Metals Co. of Richmond, Va., has taken to getting used 1130s for use in laboratories. They have bought four 1130s in the past three years, three of them used and one direct from IBM.

"We not only saved money on the computers, but got enhancements over our previous configurations. On the three used IBM machines, we saved about 25% of the IBM purchase price," said spokesman Joe Reynolds.

Reynolds said buying several computers at low prices has given the company the flexibility to save more money in swapping computers from laboratory to laboratory and in buying new configurations.

"We've had very good luck in picking up odd pieces at a good price," said Reynolds. The company has bought a General Automation 1830 to replace the IBM piece, for instance, and got a third-party loan on a 2311 disk drive for $100/mo.

What you see and hear at The 1975 Computer Caravan will save you money. And when has there been a better time for that?

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Includes four concurrent workshops, each given twice:
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2 Performance Measurement
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DAY TWO – SOFTWARE
A new topic for a Caravan Forum. Workshops will be on:
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4 Utility Software

DAY THREE – TRENDS AND OPTIONS IN DATA COMMUNICATIONS
Workshops fall into two general categories – equipment and techniques. They include:
1 Data Transmission Options
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3 Terminals
4 Front End Processors

Special Afternoon Sessions will continue to be open to all attendees.
Whether or not you attend the morning Forum program, you'll want to consider the special afternoon sessions. This year's topics are:
Day 1 – Professional Development
Day 2 – Virtual vs. Real Storage
Day 3 – The Human Interface: External Opportunities and Dangers for Data Communications Users.

The daily schedule gives you time to get the information you want.

FORUMS

9:00 – 9:45	Introduction and *Computerworld* Report
10:00 – 11:15	Workshops – Phase I
11:15 – 11:30	Coffee Break
11:30 – 12:45	Workshops Repeated
1:00 – 2:00	Luncheon
2:15 – 3:00	Wrap Up Panel

SPECIAL AFTERNOON SESSIONS
3:15 – 4:30 Daily (Open to all Caravan attendees)

EXPOSITION
First two days – 10:00 A.M. to 6:00 P.M.
Third day – 10:00 A.M. to 5:00 P.M.

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The Caravan gives you the information you need to increase efficiency and save money.
Change is not news in the computer industry. Information is. And the Computer Users' Forum and Exposition brings you a unique combination of information sources. The User-to-User Forum lets you exchange experiences and share solutions with other users in a series of panels and workshops. And The Exposition gives you information direct from suppliers in an informal, businesslike atmosphere. You can shop around and make comparisons among many suppliers at the same time. And when you're finished, you'll be able to apply this information to your installation. You'll increase efficiency and save money. That's the heart of it. Here are the details:

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Just use the form on this page to make your reservations for our Forum program. If you plan to attend only the Exposition, no advance registration is required. If you are not a *Computerworld* subscriber, you may want to write for a free guest ticket to the Exposition. (If you are a subscriber, we should be mailing you a free ticket automatically.) Just send your request to the person shown on the Forum Registration Form. And plan to be there when the Caravan comes to a city near you.

The '75 Caravan is coming to a city near you. Going your way is our way.

Phila. March 4-6 (Tues., Wed., Thurs.)
Exposition and Forum: Philadelphia Civic Center (Center Exhibition Hall) Civic Center Blvd. at 34th Street.

Hartf'd Mar. 11-13 (Tues., Wed., Thurs.)
Exposition (and all registration) Hartford Civic Center, 190 Trumbull Street
Forum: Sheraton Hartford Hotel, 196 Trumbull Street.

N.Y. March 18-20 (Tues., Wed., Thurs.)
Exposition and Forum: New York Coliseum (4th Floor), Columbus Circle.

Clev. April 1-3 (Tues., Wed., Thurs.)
Exposition and Forum: Cleveland Convention Center, 1220 E. Sixth Street.

Chicago April 8-10 (Tues., Wed., Thurs.)
Exposition and Forum: McCormick Place, On-The-Lake

St. Paul April 15-17 (Tues., Wed., Thurs.)
Exposition and Forum: St. Paul Civic Center, I.A. O'Shaughnessy Plaza

Seattle (Tues., Wed., Thurs.) April 29-May 1
Exposition and Forum: Seattle Center, 305 Harrison Street.

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Rethinking Key Element in Getting Good VS Results

(Continued from Page S/7)

designate that it be placed on contiguous pages and be held in main storage as a nonpageable unit while the program is executing. The reduction in the amount of paging, as one might expect, is quite startling once the working set has been established.

Establishing the working set is anything but easy since, as the application processing progresses, the working set will change. Thus, it is conceivable the user will have to rethink the program's logic or identify multiple working sets and mark them as nonpageable during the time they are the core of the program.

To write or rewrite programs to isolate the working set will necessitate some reorientation on the part of the programming staff. Most programmers have in the past used, and to a degree still use, the mainline and closed-subroutine concept of program layout.

Simply stated, this means the routines required for processing each type of transaction are placed together, with common service routines placed at the end of the listing. The benefits of this layout are that mainline program logic can be easily traced, program debugging and maintenance are easier and modifications are easier to implement.

In classic mainline processing with closed subroutines, the mainline code consists only of tests. The actual work is performed by the closed subroutines entered as a result of the test in the mainline code after each successive step. Now, if all code is main storage resident, this isn't too much of a problem. However, under VS, the mainline code may be held in VS. The consequent jumping back and forth between virtual and real storage causes excessive paging, with accompanying operating efficiency drops, as the system moves toward thrashing. As one can see, mainline coding with closed subroutines can be catastrophic under VS.

Restructuring Programs

Restructuring or, if necessary, rewriting application programs is the key to attaining efficiency under VS. Any "re" in DP means money – lots of it, but it's money well spent. By restructuring or rewriting your application programs, you will realize between a 50% and 90% reduction in paging operations, according to IBM. There is no cause to doubt the accuracy of that claim.

To restructure programs, four tasks must be carried out:

- You must modularize your programs.
- Modules used together should be on the same page, if possible.
- Seldom-used modules must be grouped at the end of the programs.
- Branching targets must be kept close to branch locations, preferably on the same page. If you are running Cobol programs, place service routines such as the report header and error printing routines into the mainline code. Append error routines into the basic logic flow.

These changes condense the code so the most frequently used routines are contained in as few areas of the program as possible, and a higher percentage of the most frequently used code is real storage resident. In other words, the changes place the most frequently used code together.

To determine the most frequently used code, you can either have someone familiar with the programs identify it by counting the various transactions the program processes, or you can use one of the commercially available code optimizer packages. If none of these approaches is possible, have the system count and tally the number of times the program executes a module. Use the tally to determine the most frequently used modules and then restructure.

Hunter is the software project editor for Auerbach Computer Technology Reports.

Customized Forms Lower Direct Costs

(Continued from Page S/15)

operations manager.

"Costs are reduced 50% or $500 by automatically handling stencil tabbing in-house," Del Giudice stated. "Previously, we paid five cents a stencil or about $1,000 a year to have stencils tabbed on shipping orders on the outside. Now, it costs us less than $500 a year in rental charges to automatically tab stencils internally.

"Stencil quality is improved because automatic tabbing results in more uniform application of stencils on shipping orders," he added. "Quality is also better because we can now order and tab stencils as we need them, 1,000 or so at a time. As a result, stencils are always fresh and the possibility of problems is minimized.

"Formerly, we had to order and tab stencils 10,000 at a crack to take advantage of volume purchasing requirements," he explained. "But then the stencils would sit around the warehouse for three, four or five months, resulting in the possibility they would dry out, bleed or otherwise create problems when we went to use them.

"We also have greater speed and flexibility in tabbing stencils," Del Giudice commented. "We no longer have to worry about coordinating with a middleman in getting the job done.

"We initially installed our own tabbing equipment, in fact, because of the lack of speed and flexibility of outside tabbing," he related.

"We had a situation where prices had been increased and we had to retab an open order file of 14,000 shipping orders in 3-1/2 weeks. There was no way we could get this number of stencils tabbed on the outside in time. So we ordered the tabbing equipment, got it in the next day and tabbed stencils internally to meet the deadline."

Now, when stencils are to be tabbed, continuous-form shipping orders are placed on a platform of the Model 300 tabber which automatically pinfeeds them across a tabbing plate.

Plain stencil paper in roll form is simultaneously fed to the tabbing plate where stencils are cut to size, spot positioned and tabbed on shipping order forms at the rate of 2,000 per hour.

Forms are counted as tabbing is completed, and the tabber automatically shuts off when either the last form or stencil is processed.

Completed forms are used to run shipping orders at night on an IBM 360/30. Data simultaneously printed on shipping orders and cut into tab-on stencils includes "ship to" addresses, shipping order numbers and customer order numbers.

In the shipping department, tab-on stencils are removed from shipping order forms and mounted on Weber handprinters which are used to mark data on all cartons in each shipment.

Of course you should.

The EDP Seminar Series gives you the information you need to keep ahead of this fast-changing industry.

We've selected leading experts from around the country to give seminars on some of the most important topics on today's EDP scene. These seminars are current, practically oriented, and packed with detailed information. They will help you save time and money. And they can give you the information you need to increase your installation's efficiency. In an increasingly complex and fast-changing EDP world, these seminars are even more important to your company, your installation, and you. Here is our current seminar schedule.

Data Communications

Course #1010 –

Practical Data Communications Systems and Concepts

This course will give you the information you need to master the newest developments in Data Communications. Led by the nationally recognized teleprocessing consultant, Dr. Dixon Doll, the course covers recent changes in areas like SDLC, HDLC, DDS, newly approved major revisions to WATS, and the impact of satellite carriers. This seminar runs two days, and total cost, including workbook, reference materials, luncheons and continental breakfasts is $350. Additional registrants from the same company qualify for a reduced rate of $300. Current schedule is as follows:

Chicago – Jun 2-3
Orlando – Jul 2-3
Washington, D. C. – Jun 9-10

Course #1020 –

Advanced Teleprocessing Systems Analysis and Design

This course is a follow-up to Course #1010, with special emphasis on problem solving techniques for minimizing operating costs in commercial data communications networks. Also led by Dr. Dixon Doll, the course covers procedures, approaches and algorithms for evaluating and cost optimizing network organizations.

This seminar runs three days, and total cost, including an extensive set of customized course materials, luncheons and continental breakfasts is $450. Additional registrants from the same company qualify for a reduced rate of $400. Current schedule is as follows:

Los Angeles – Jun 16-18

Data Base Design

A practical approach to the design, implementation, and maintenance of data base systems.

Effective data base system design requires both a complete knowledge of the facilities provided by a data base package, and a basic understanding of the mechanisms which can be employed to construct data base systems. In fact, the former is of questionable value without the latter.

This course is a package independent examination of the techniques required for the design of effective data base systems. The topics covered include:

- *Effective Record Design*
- *Physical Storage Techniques*
- *Optimum File Organization and Indexing Techniques*
- *File Integration*
- *and much more*

Given in association with Leo J. Cohen and Performance Development Corporation, this course reinforces the lecture material with workshops, in which attendees apply the techniques just learned, to practical problems.

You should attend this seminar if you are (or will be) involved in the design and/or implementation of a data base system and whether as a Data Base Designer, Planner or Analyst.

This course runs for 3 days and costs $350, including course materials, continental breakfasts and luncheons. Additional registrants from the same company qualify for a reduced rate of $300. Current schedule:

Chicago	Sheraton O'Hare Motel	May 12-14
New York	The Plaza	June 2-4

Legal Tools for Computer Contracting & Protection

A seminar that gives you the legal tools you need for effective negotiations, agreement drafting, warrantee, security, tax planning and software protection.

The impact of the law is felt in virtually every aspect of the computer industry, and you need to know how to apply the legal rules in a positive way to increase you advantage in dealing with vendors that supply your installation. This course teaches you how to avoid the legal pitfalls that can be costly and embarrassing to you.

Under the personal instruction of Roy N. Freed, a nationally known lawyer, author, educator and expert in the field of Computer Law, you'll learn how to protect your interests in subject areas like these: Negotiations, Contracts, Warranties, Avoidance and resolution of disputes, Security, Fraud, Taxation, as well as Techniques in handling any transaction. And practical discussion and review of your own contracts is an added feature of this seminar.

You should attend this seminar if you are involved in contracting for the use of computers or computer services–whether as a Corporate Executive, DP Manager, Contract Administrator, Consultant, Inside Counsel, or as a Private Practitioner involved with clients who use computers. Cost for the entire 2½ day seminar, including continental breakfasts, luncheons, and complete resource materials is $325. Additional registrants from the same company are charged only $275. Current Schedule:

New York	St. Moritz	June 4-6
Atlanta	Stouffers Atlanta Inn	April 23-25

Operating Systems and Virtual Storage

A seminar on more efficient operation of your computer system.

Large installations now expect many programs to run simultaneously and efficiently. And that's what this 2½ day seminar is all about. Under the leadership of Dr. Ivan Flores, author of 14 books and one of the world's most prolific writers on systems software, you'll gain an excellent technical knowledge of your operating system, OS and VOS. The course uses the IBM/370 as its subject computer, because of its popularity, and includes these topics:

- Overview of Operating Systems
- Hardware aspects of Operating Systems
- Job Management
- Task Management
- Data Management
- Virtual System Philosophy
- Virtual Hardware
- Virtual Storage Operating Systems

Everyone involved with operating systems can benefit from this seminar. Programmers can enjoy its lesser known features. The manager can choose an operating system and options to handle his installation more efficiently. The chief operator can understand what's happening and better manipulate the system. The executive can determine the requirements for his plant.

Cost for the entire seminar, including course materials, luncheons and continental breakfasts is only $295.

New York Waldorf-Astoria May 5-6

Key-to-Storage Systems

How to evaluate and optimize the various successors to keypunch equipment.

Data entry is a big problem – and a big headache – as every computer user knows. It is therefore a prime target for cost savings. This course is designed to help you in the practical aspects of selecting, installing, and making the best use of keyboard-to-storage systems. It is an expansion and an update of our successful key disk seminar. Under discussion (including some user case studies) will be:

- Introduction to data entry concepts (keypunch, buffered keypunch, keypunch, key-disk and beyond . . .)
- Key disk hardware and software
- Evaluating and starting key disk systems
- Selecting and operating intelligent terminals, both key-to-cassette and key-to-floppy disk
- Key disk as a remote batch terminal
- Supervisor functions, motivation
- Mixed Media systems
- Trends in Computer Data Entry

This seminar is lead by Lawrence Feldelman, President of Management Information Corporation, and one of America's leading experts on data entry. All participants will receive a copy of "Data Entry Today", Management Information Corporation's authoritative publication on every aspect of data entry, including a six month update of this continuing reference service.

You should attend this seminar if you are concerned with optimization of your data entry shop, and especially if you are considering or currently using key-to-storage systems more advanced than basic keypunch. Cost for the 3 day seminar is $350, including continental breakfasts, luncheons, and all course materials. Additional registrants from the same company are charged only $300.

New York	Waldorf Astoria	April 21-23
Chicago	Hyatt Regency O'Hare	June 9-11

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NOTE: If time is short, you may reserve space at any seminar by calling collect. Call Miriam Ober at (617) 965-5800.

Lessor Group's Enhancements Give 360 'New Lease on Life'

"We are now totally convinced the IBM 360 will be around the computer industry until at least the late 1980s or early '90s," said Tom McArdle, president of one of the Computer Lessors Association's (CLA) member companies.

"IBM just hasn't been able to obsolete it," McArdle continued, "and, therefore, we're looking for ways to enhance the 360 portfolio we have."

That faith in the durability of the 360 defines many of the major activities of the CLA – developing and promoting hardware and software enhancements that will benefit end users. Most of those benefits, CLA members feel, involve 360s.

Jim Benton, CLA's executive director, cited two projects the organization backs that are geared to making the 360 more convenient to use. One is obtaining DOS support services from Computer Software Corp. in Richmond, Va., for any 360 customer of a CLA member.

DOS problems have discouraged potential buyers from picking up 360s, Benton said, because IBM recently gave up DOS support.

Liberator Program

A second project, also performed by Computer Software Corp., is a liberator program translating RPG-II programs, developed for System/3 machines, into 360 code.

Some larger System/3 users are now paying $8,000 to $10,000/mo for their machines and could move to used or leased 360s for that price, Benton pointed out. The conversion program will be marketed only by CLA members, he said.

Along with developing such programs, CLA tries to steer its customers toward other enhancements of 360 systems, such as Dearborn Computer's DOS/RS or Computer Software's Edos and Gemini programs, Benton said.

The former two are DOS enhancements, while Gemini is a program that enables a user to connect a 360 to a larger 360 or 370 and use the smaller machine as a front-end processor.

Computer Software spokesman Jerry Enfield said there have been six installations of Gemini to date; two of them, both lashing 360/30s onto 360/50 machines, reported 35% and 40% improvements, respectively, in the throughput of their 360/50s.

CLA members offer some enhancements on their own, in addition to those listed above. Greyhound Computer Corp., for instance, has developed a 360/30 accelerator it calls Phoenix, which enhances 360/30 performance by 25% to 33%, according to Greyhound spokesmen.

Art of Winemaking Gets Modern Boost From IBM System/3

NAPA, Calif. – A computer is helping to advance the state of the ancient art of winemaking here at the 93-year-old Christian Brothers Winery.

In the early days of the winery, grapes were grown on 12 acres of land and then crushed by the biggest of the Brothers, wielding large clubs. Only one kind of wine was made.

Now the winery has grown to about 2,600 acres, with 35 varieties of wines, vermouths, champagnes and brandies available in 160 combinations of sizes. And a computer has joined other modern equipment in helping produce the wines.

"Over the years our goal has been to improve the quality of our wines through our technological approaches," said Brother Timothy, cellarmaster in charge of all wine production.

IBM System 3/6

"We use our IBM System 3/6 to keep track of the age of our bottles of wine, to help us make sure that quantities on hand will meet expected demands in the future. We have to allow enough time for the wine to age in its bottles; we cannot ship it too early."

Christian Brothers sells all the wine it produces, even having to limit distribution of some of the more popular varieties. Winery officials use sales reports from the system to determine what varieties to concentrate on in the future.

"We also are beginning to keep track of historical records, so we can go back and discover just what steps were taken to make a particularly successful wine," Brother Timothy said. "We then will be able to combine those steps with our present grape crop, which varies from year to year."

Just plug it into your IBM controller and save a bundle.

Look at it this way.

You have only three options when you set up or expand your system.

You can go with IBM all the way. Very nice, very convenient, but expensive.

You can opt for one of the other compatible controller-with-terminal systems. It's a cost-effective measure, to be sure, but fraught with complications.

The G77

The G77 Information Display Terminal is a 100% plug-compatible equivalent of the IBM 3277, Model 2.

It connects directly to IBM 3271 and 3272 Model 2 control units, without any software changes or connecting hardware.

The second comparison is cost.

Like everyone else, we claim savings, but ours are real dollar savings.

The third comparison is availability.

The G77 is available within 90 days.

In our business, that's real time savings.

Then compare the features.

The G77 does what the IBM terminal will do.

And it will do a lot more:

1. A home key to return the cursor to first character position.
2. Automatic Variable Initialization for bright-dot display of variable data.
3. A repeat key.
4. Blinking cursor.

Available options include:

5. An audible alarm.
6. Key lock, to prevent unauthorized use.

What this boils down to is a super-performing, completely compatible terminal at absolute minimum cost.

Our equipment is backed up by our 15 years of data processing sales experience and our national marketing and maintenance facilities.

GENESIS ONE is a "total" data processing company, and we list over 300 of the Fortune 500 companies on our client roster.

With our record of service and reliability, we can save you a bundle.

If you plug in THE PLUG.

You know them as well as we do. Up-front costs are considerable, too, before the ultimate savings are realized.

Or you can choose the new G77 terminal by GENESIS ONE and leave your IBM control unit alone.

The G77 is a plug-to-plug compatible terminal available all by itself. We call it THE PLUG. Substitute it for IBM terminals or add it on when you expand to extra terminals. No changeover headaches, much lower price, lots of extra features.

Which brings us to the nitty-gritty. How does the G77 compare?

First, here's how THE PLUG compares on compatibility.

GENESIS ONE
COMPUTER CORPORATION
300 East 44th Street, Dept. 930, New York, N.Y. 10017 Tel. (212) 557-3500

Dear GENESIS ONE:
Your G77 Information Display Terminal sounds terrific.
Please send me all the specs.
Have someone call me: _____
Telephone Number

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

THE PLUG and G77 are trademarks of Genesis One Computer Corporation.
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MINIWORLD

Mini Bits

HP-3000 Users Get Voice

In Product Plan Reviews

CUPERTINO, Calif. – Users of Hewlett-Packard HP-3000 minicomputer systems will get a regular opportunity to contribute to development of future generations of HP-3000 systems as a result of a recent HP-3000 Users' Group meeting in Miami.

Members of the technical planning committee of the Users' Group will meet here every two months with HP representatives to review HP product and product support plans and recommend product features and changes to the manufacturer.

The User's Group has also agreed to review documentation prepared by HP in support of its 3000 system and will make suggestions for improving the material.

Varian Drops Statos 3110 Price

PALO ALTO, Calif. – Varian Data Machines has reduced the price on its Statos 3110 electrostatic printer/plotter by $1,000. This model produces hard-copy output on standard 14-7/8-in.-wide roll or fanfold paper.

Reduced to $6,950, the Statos 3110 can be interfaced to most popular minis, Varian said.

Varian is at 611 Hansen Way, 94303.

Qume Adds 'Daisy Wheel' Fonts

HAYWARD, Calif. – Qume, Inc. has introduced three "Daisy Wheel" fonts for its printers.

The type styles are Prestige Elite, Prestige Elite Legal, and Legal Courier 10.

All of Qume's Daisy Wheel fonts are compatible with Diablo printers, Qume said. Proportional spacing is available as an option.

The wheels are priced at $12.50 each from the company at 2323 Industrial Parkway West, 94545.

Acquisition/Logger Works in Labs

SAN ANTONIO, Texas – Data Graphics Corp.'s Dataquire is a data acquisition/logger to monitor quality control or scientific experiments.

The stand-alone system can log from 10 to 1,000 points; with access to a computer, the system can control output relays or programmable instruments and generate analog voltages or frequencies with a one-microvolt resolution.

Dataquire sells for $3,400 from the firm at 8402 Speedway Drive, 78230.

Tally Punch Run by Solenoid

KENT, Wash. – Tally Corp.'s MP-30 is a solenoid-operated, 30 char./sec tape perforator for business machine and logging applications.

The device costs $500 (mechanism only) from the firm at 8301 S. 180th St., 98031.

Minis Explained—Part 1

Capabilities Define Size Classification

By Leonard Farano
Special to Computerworld

Minicomputers are making a dramatic impact in the commercial DP marketplace. Superimposed upon the numbers of vendors is the wide variety of their offerings. How does the prospective purchaser prepare for the evaluation, selection and installation of such equipment?

While no do-and-don't list covers any or all situations, there are important questions to be answered before a reasonable selection can be made. The following guidelines are an attempt to provide the minicomputer shopper with some assistance in that selection process.

The scope of these guidelines is limited to minicomputers whose usage will be general purpose and have complete stand-alone capability.

The steps to be performed in the evaluation process include the following:

- Preparation of a detailed set of vendor specifications clearly defining the objectives (must and wish) to be satisfied.
- Submission of those specifications to reputable minicomputer manufacturers whose offerings appear to generally fit the requirements.
- Careful evaluation of the vendor's proposals submitted in response to these specifications.

The specifications will vary depending on the scope of the job or application the minicomputer is going to perform. As a minimum, however, the specifications and vendor proposals must provide information concerning the hardware, systems software, application software, service and maintenance and conversion and installation.

Let us assume the minicomputers we are discussing contain four basic elements of equipment: CPU, video display, disk storage and printer. The capacities, speeds and numbers of these devices largely determine the classification of "mini," "midi" or "maxi" minicomputer that are being somewhat arbitrarily assigned to them.

	'Mini'	'Midi'	'Maxi'
Storage (Bytes)	4K-16K	16K-64K	64K-256K
Video Display (Number of Devices)	1-2	2-4	4-32
Disk Storage On-Line (Millions of Bytes)	5-10	10-40	40-100+
Printers	Character Printers 30-165 Char./Sec	Line Printers 200-600 Line/Min	Line Printers 600-1,200 Line/Min
Other Peripherals: Card Reader Punch Magnetic Tape	Not Usually Available Rarely Used	Available Used for Backup and Interface	Available Used for Backup and Interface
Communications	None to Limited	Limited to Full	Full

Today, minicomputers can be divided into three classifications: "mini", "midi" and "maxi".

CPU Storage

Minicomputers can perform tremendous amounts of work in relatively small amounts of storage. This is primarily due to the "low overhead" OSs supplied with most equipment.

The vendor should specify how much "usable memory" is available in a given module. Some minicomputers utilize unaddressable memory for residence of their OS, while others house their OSs in memory which the user must share with his application programs. Have the vendor specify the maximum storage that can be made available to the system, the size and cost of those storage increments and any other equipment necessary to support additional storage. Internal speeds are important but difficult to evaluate.

Most minicomputer applications are not process bound – limited by internal processing speeds – and, therefore, internal speeds are usually sufficient to accomplish the tasks. This is especially true for "mini" minicomputers. As one expands to the "midi" and "maxi" classes, the number of tasks occurring simultaneously usually requires faster internal speeds if system response time is not to degrade.

Video Display

One of the most attractive features of minicomputers is that most incorporate video display devices into their framework. In fact, it is the video display or CRT which permits the user to take advantage of a system without any technical knowledge of the system.

These devices, driven by the stored program resident in the CPU, can lead the user step-by-step through each and every transaction. In essence, the CRTs enable the user to converse with the information being stored in the system. He uses them to enter new data and to inquire and retrieve existing data.

The CRT replaces, for the most part,

(Continued on Page 30)

Firm Builds System Around Nova To Receive, Process Sales Data

WINSTON-SALEM, N.C. – An on-line sales information and processing system developed by Lowe's Companies, Inc. will use a minicomputer to speed order building, inventory checks and invoicing in each of Lowe's 128 building materials outlets.

The system will also communicate with the company's central office computers.

Called Accusale, the new system is now in operation at 17 Lowe's stores, and the company is in the process of expanding the system to its other stores throughout the southeastern U.S.

Each sales counter in each store has an interactive Conrac 480 CRT which the salesman uses to build the order. As he enters quantities of any of the 6000 to 7000 items stocked by the outlet, the program in a 32K Data General Nova 1200 system checks inventory, alerts the salesman to out-of-stock items and provides a running tabulation of total order cost on a CRT screen. The customer can review this with the salesman and revise his order as necessary.

When the order is complete, the system activates the salesman's sales ticket printer to produce an invoice with the sales tax figured in. At any time during the whole process, the salesman can spot-check the price or availability of any item or answer customer's questions.

Printer Generates Invoice

For commercial customers, the system runs credit checks and provides credit limit figures. When credit is verified and the sale is closed, the system posts the sale to the customer's account and the printer generates the invoice.

Since the inventory has already been checked, the warehouseman can quickly and completely fill out the order on the invoice.

The Nova 1200 system includes a Data General disk controller, two Diablo cartridge disks providing 4.8M bytes of storage and one or two Centronics printers.

Depending on the store, the configuration also includes a number of Data General Asynchronous Multiplexers, each handling four lines to salesmen's terminals; synchronous line adapters; and ICC 2,400 bit/sec synchronous modems.

In the store manager's office, there is a

(Continued on Page 31)

Devices' Capabilities Determine Classification Size

(Continued from Page 29)

the traditional punched card and the keypunching and key-verification steps which produced it. This allows a person knowledgeable with the application to utilize the computer without any intervening translation steps.

Screen sizes, in terms of characters to be viewed simultaneously, vary from 200 to 2,000 characters. The application largely determines the need, but larger screen sizes are increasing in popularity.

One important aspect is that the vendor should supply systems software that enables easy movement of the cursor, the moving blip which designates the place at which the data is to be entered.

Since CRTs are used as input devices, the keyboard associated with them should be of good design. Considerations should be given to whether typewriter or keypunch-format keyboard is required and if a 10-key adding machine pad could be useful. It should be movable so the operator can adjust it for comfortable keying.

The vendor should indicate how many such devices the system will support and what the incremental cost of each additional device will be. He should also specify what other equipment may be necessary for adding additional devices. For example, some vendors require a fixed allocation of internal storage for each additional CRT.

Others may require a separate controller or expander for additional units. The ability to utilize more than one terminal and/or more than one program simultaneously may largely be a function of the OS provided, which will be discussed under system software.

Disk Storage

Most minicomputer manufacturers offer disk storage in the form of removable disk pack storage. Typically, disk drives may contain two such removable packs, one fixed-head disk and one removable. The capacity is usually about 5M byte/drive. Removable storage obviously allows for more flexibility in that data, for different applications may be stored on different packs. Again, the vendor should comment on expandability, incremental costs and additional equipment required.

Storage capacities for "minis" range from 5M to 10M bytes, for "midis" from 10M to 40M bytes and for "maxis" from 40M to 100M + bytes.

Printer

As with any computer, the ability to provide "hard copy" output is essential. Most minis support low-speed print devices such as teleprinters or matrix printers. These devices typically have speeds of from 30- to 165 char./sec.

Line printers of from 100- to 1,200 line/min are supported by "midi" and "maxi" systems.

Other Peripherals

Most minicomputers in all classes avoid the use of punched cards. Many "minis" do not support card equipment. "Midis" and "maxis" normally support such equipment. Applications for minis generally are on-line, real-time-oriented and do not utilize cards which are primarily batch-oriented.

Magnetic tapes on mini systems are primarily used for backup or for interfacing with other systems. "Minis" rarely use magnetic tapes. "Midis" and "maxis" occasionally do.

Most minis can communicate either to remote peripheral devices, other "minis" or larger mainframes. Many, however, will not support speeds greater than 300 bit/in. The vendor should specify in detail how his equipment will meet your communications requirements.

In Part II, Farano will discuss mini software. Farano is executive vice-president of Gambit Management Strategies, Inc. in New York.

Wang Digitizer Inputs Directly

TEWKSBURY, Mass. – The Model 62 Digitizer from Wang Laboratories coordinates input from drawings, plots, X-rays and forms directly into Wang computers and programmable calculators.

The digitizer converts data directly from a graphic to a digital format without measuring, keyboarding or card punching. Coordinates can be read at a rate of 200 points per second with an accuracy of .01 in.

Equipment consists of a tablet (20-in. by 20-in., 30-in. by 40-in. or 36-in. by 48-in.), a digital control unit, a controller board and a cursor or pen-type stylus.

The Model 62 varies in price according to the tablet size: $5,000 for the 20 in.; $7,000 for the 30 in.; and $8,000 for the 36 in.

The company is at 836 North St., 01876.

TI Adds Recorder

HOUSTON – Texas Instruments' (TI) Graphic 200 annotating recorder/logger records one or two continuous traces on a 10-in.-wide chart while printing alphanumeric characters over the middle 8-3/4 in. of the chart paper.

The device uses thermal stylii, a nonmoving solid-state printhead and thermal-sensitive paper.

The Graphic 200 costs under $3,000 from the firm at P.O. Box 1444, M/S 784, 77001.

...Ring Configuration the Next Step for Lowe's

By Patrick Ward
Of the CW Staff

WINSTON-SALEM, N.C. – Lowe's Stores is about to ditch its IBM 370/135 central mainframe for seven Data General Eclipse C300 systems and a Nova 840, which will be grouped in a ring and linked together with 50 kbit/sec data channel communications.

"This system, with eight processors, 109 Applied Digital Data Systems CRTs and 10 Dataproducts printers, all of them linked with high-speed communications, will cost us less than the 370/135 we have right now with no terminals, two printers and one-third the disk storage," John Acree, DP director, said.

"We will develop a complete distributed processing system," he said. Dual or single processors will be handling one particular department's functions, even though the CPUs will all be grouped in one room.

The processors will share files over the data channel links. The inventory file, for example, will reside in the purchasing department's processor because that department is its primary user, but the inventory file will also be available to the marketing processor.

And when the accounts payable department gets an invoice from one of Lowe's suppliers, it will look at the purchase order, which originates from the purchasing processor, as well as the receiving report and invoice from its own processor.

"When it decides to pay that invoice," Acree explained, "the act of paying it in the accounts payable processor will create a task in the general ledger processor to post that transaction."

This will all be handled in the software without any manual transfer of that kind of data, he added.

Dual C300s will run the purchasing department's work; another dual configuration will handle accounting tasks, Acree said.

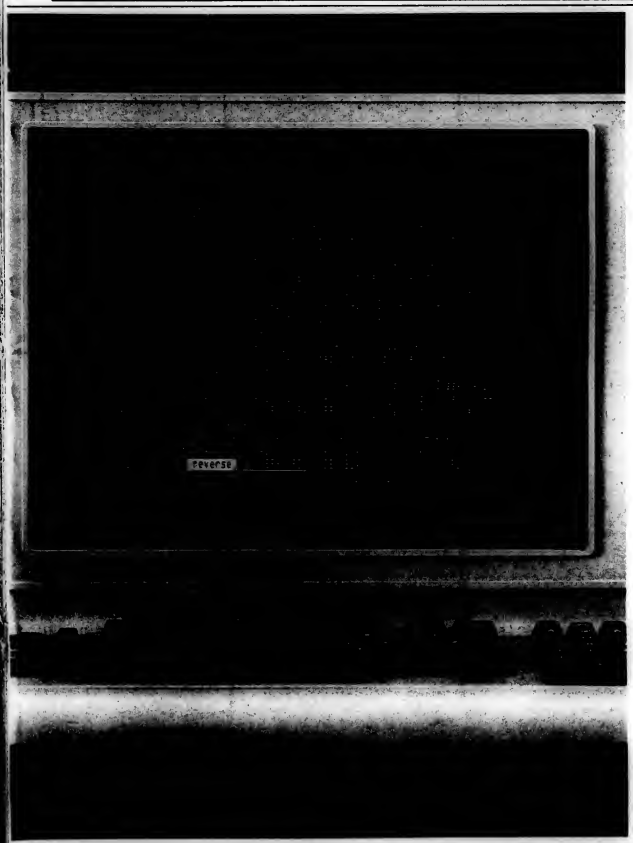
A single C300 will run marketing tasks; another will run accounts payable, costing and expense control; and the sole 840 will handle communications with the 128 Data General Nova 1200 mini Lowe's will eventually have in sales outlets across the Southeast.

The last C300 in the ring will be a control processor to enable Lowe's to "have a window into the system."

Acree gave reasons, other than cost, for wanting to go to this ring of minicomputers.

"I don't agree with the approach of having all the data come into one central point, have it processed and then give it back," he said.

Secondly, this design for providing corporate information "makes complete real-time processing possible, while one large central system almost forces a batch approach," Acree stated.



Retailing Firm Builds System On Nova 1200

(Continued from Page 29)

display and keyboard console where he can monitor the credit checks, override prices and credit limits as he sees fit and review salesmen's activity.

Unattended Operations

At the end of each day, unattended and using a dial-up telecommunications system, the store computer is polled by a Nova 840 computer at Lowe's central office. The store computer transmits information on sales, profit margins and sales commissions, and the 840 sends this information to disk for processing by the IBM 370/135 currently in the corporate computer center. This 370 will soon be replaced by a ring of Data General Eclipse C300s.

The store computer also posts accounts receivable, analyzes the aging of accounts receivable and reports inventory data. At the end of each month, it generates a statement of each account.

Each night, also unattended, the 370 sends back through the system all new information on inventory and prices so salesmen can start the next day with current data.

Previously, Lowe's had relied on a card-based system with accounting machines on the sales floors. While this system produced clear invoices, the cards were subject to wear and other perils and the volume of cards to be handled was cumbersome.

Up to 300,000 cards were mailed to the central office each week from the stores in chain for processing by the corporate system.

The Accusale software was written by Lowe's in Fortran IV, using Data General's Real-Time Disk Operating System, which handles file management duties, monitors access to I/O devices and schedules tasks.

The software consists of four modules: sales-based functions, accounts receivable, communications and utilities.

Lowe's has further duties in mind for its system, including a complete store accounting system and an overall analysis to cover each store. The latter would determine such things as which items are moving well and what salesmen are selling what items.

Lowe's is presently considering marketing the full system to other organizations.

Traffic Flow System Pays Back Installation Costs in One Year

Special to Computerworld

CHARLESTON, S.C. – Two computers are working together to move more cars faster through the streets of this city. And the computerized traffic flow system has saved the city more in one year than the capital outlay to install the entire system, according to Howard R. Chapman, director of Charleston's Department of Traffic and Transportation.

Traffic has been stepped up 21%. Fewer starts and stops are saving motorists time, money and fuel. Charleston drivers are getting greater mileage than ever without mechanical alterations to their vehicles, he said.

PDP-8/L Counts Cars

The city has pioneered a traffic flow management system using analog computers to sense rate changes and control signals and a Digital Equipment Corp. PDP-8/L to count cars, determine accumulation, monitor the operation, gather data for analysis, isolate trouble spots, place signals on flash when necessary and direct repair crews to malfunctions in the system.

Sensors monitor traffic flow along the network. These sensors feed traffic flow and direction information to a master control assembly which, in turn, sends electronic impulses to local traffic signals regulating them so that traffic flows steadily.

Special emergency routes can be set off on command from the master control operator. The control center has a direct connection to the communications center of the Charleston Fire Department.

In an instant, traffic lights along any one or all 10 emergency routes can be set to flashing green: simultaneously, lights on cross routes are shifted to flashing red.

Miniworld Products

IDS Conductor Cables Meet RS-232C Specs

PROVIDENCE, R.I. – International Data Sciences, Inc. (IDS) now provides 25-conductor cables with connectors and pin assignments meeting the RS-232C specifications.

Special cable configurations are available. Cable lengths and connector polarity can be specified for quick turnaround fabrication, the firm said.

The cables are priced at $25 for the pair of end connectors and 70 cent/ft for the cable length.

The company is at 100 Nashua St., 02904.

Wangco Fixed Disks 'Equal to' IBM S/32

LOS ANGELES – Wangco is offering a nonremovable media magnetic disk drive featuring capacities it said are "equal to" the IBM System/32 disk storage module.

The Series N/S32 drives utilize an electromagnetic voice coil actuator and optical detent system, providing track-to-track access time of 15 msec and full stroke time of 150 msec, with 70 msec average, the company said.

The N/S32-2222 features two fixed disks, 200 track/in. and a recording density of 2,200 bit/in., providing 100M-bit capacity.

The N/S32-2212, with one fixed disk, has a capacity of 50M bits.

The disk rotation speed is 2,400 rev/min.

Priced around $2,000 each, the drives are available from the firm at 5404 Jandy Place, 90066.

Development Board Fits DG, DCC Minis

MINNEAPOLIS – Custom Systems, Inc. has a multiple controller wirewrap board for Data General (DG) or Digital Computer Controls (DCC) D-116 minis.

The board is said to provide the sophisticated end user with a low-cost means of developing several special interface controllers on a single board, thereby minimizing the number of card slots used within the minicomputer.

The Series 240 board is priced at $450 from the company at 4935 Boone Ave. North, 55428.

SAC V-3 Motorized Viewer Reads Data From Graphics

SOUTHPORT, Conn. – The Model V-3 Motorized Chart Viewer from Science Accessories Corp. (SAC) is designed to read data from strip charts or other graphic material and send digital signals into a CPU by use of a Graf Pen sonic digitizer.

The V-3 handles charts in either continuous strip form or as individual sheets. The device can interface the Digital Equipment Corp. PDP-8, 11, 12 and 15 minicomputers, the Data General Nova line, the Honeywell 316 and Varian machines, a spokesman said.

The Model V-3 and Graf Pen costs $2,750 from the firm at Kings Highway West, 06490.

Remex Model 7000 Reader Includes Fiber Optic System

SANTA ANA, Calif. – A punched tape reader from Remex is the first to feature the company's newly introduced fiber optic light distribution system.

The fiber optic system, soon to be available on Remex's full line of punched tape readers, is presently part of the Model 7000 tape reader.

The Model 7000, with a 4-1/2-in. by 4-1/2-in. front panel, is said to be one of the smallest tape readers available. It offers a 300 char./sec read speed with bi-directional capability, the firm said.

The reader will accept tape of five to eight levels, including 6-level advance feed tape, with infrared transmissivities to 57%.

Calcomp Makes Floppy Formatter

ANAHEIM, Calif. – California Computer Products, Inc. (Calcomp) has production quantities of the Calcomp 1140 floppy disk drive formatter available.

The 1140 is a microprocessor-controlled electronics subsystem designed to control up to four Calcomp 140 floppy disk drives.

Typical 1 by 2 systems are priced at about $2,500. The firm is at 2411 W. LaPalma Ave., 92801.

Includes Personnel Costs

Small Corporation Tailors System for $20,000/Year

By Nancy French
Of the CW Staff

HARTFORD, Conn. – Given current minicomputer technology, a small corporation can have a real-time computer system, customized software, interprocessing capability and a clerk to run it all for less than $20,000 a year, according to John D. Pearse, sales manager for Pearse-Pearson Co., Inc. in Bloomfield, Conn.

What's the catch? There isn't one. "You need a clerk to turn it on and put paper in the printer." From there, the system literally runs itself, Pearse told a recent Computer Caravan session here.

As a satisfied user of IBM's 407, an ancient tab card system that cost the company only $700/mo, Pearse said it was difficult to justify moving up to something else.

"It was like having a 1930 car that's all depreciated and still running," he said, "but we finally reached the point that, if the state ... put a sales tax that needed three-digit accuracy, our system would be out of business immediately," he said.

Batch Processing No Answer

So Pearse-Pearson began to look for a new system in a price range comparable with what it was spending. Batch processing was in that price range, but that wouldn't offer any improvements, Pearse said.

"It separates the machine from the people, tends to create more mistakes because the keypunch personnel don't know enough about the business and the other personnel don't know enough about DP," he said.

Overall, it lacks any "mutual audit capability" – the machine "can't ask the salesman who made the mistake what he meant," Pearse explained.

The company wanted the ability to correct errors as they occurred and a means to satisfy the machine/man interface – all in a system that was not a whole lot more expensive, he said.

The answer turned out to be a Basic/Four Model 400 minicomputer with 32K memory, three CRT terminals, one double disk drive with a 4.2M-byte storage capacity and a printer.

Customized Software

But how do you use a minicomputer without software and without a programmer to write it? Pearse-Pearson prevailed upon the vendor to suggest some software houses and finally selected Engineering Computer Services (ECS) in Lexington, Mass. – a company that provided software on a turnkey basis for all Pearse-Pearson's projected needs. Delivery time was 60 days.

For 15% earnest money, a third-party leasing company in New York wrote a contract that guaranteed satisfaction. Neither the hardware nor the software would be paid for until Pearse-Pearson was completely satisfied with both, Pearse said.

The system provides 10 major applications in real time:

- Inquiry to all major files.
- Customer order entry and billing.
- Accounts receivable, payable and cash application.
- Inventory control and purchasing.
- Customer sales analysis.
- Month-end tax, commission and profitability reports.
- Mailing list maintenance.
- Internal discount book.
- General ledger accounting.
- Interoffice communication.

The application programs include 81 selectable tasks, 87 programs and 184 program modules.

Displays in English

All employees can access necessary files with ease through the company's three terminals, Pearse said; the system is completely interactive, with every single display self-explanatory – in English – without confusing abbreviations or codes, he noted.

The system is designed to error-check every piece of data entered for reasonableness and, in case an error is made, the display explains the error to the operator "rather than just saying N.G.," Pearse said.

Printing is one of the only functions that is batched. "If you want to print out ages, accounts receivable, for example, before the machine will do anything it asks if the printer is ready," Pearse explained. "We've made it virtually error-proof."

Only two system-level commands exist – RUNBACKUP and RUN. In case of a wipe-out, the operator simply goes to RUN, he said.

"The system is so cheap we just turn it off at five o'clock," Pearse said. "We don't sell time on our minicomputer at night any more than we would on our typewriters," Pearse explained.

A matrix has been included in the software to assure that tasks which conflict with one another cannot be performed at the same time. For example, if someone is doing task 17 on one terminal and the matrix knows this task affects tasks 1, 15 and 5, an operator attempting to start one of them on another terminal will be told, "task conflict, try later," he explained.

"What's the catch? There isn't one. 'You need a clerk to turn it on and put paper in the printer.' From there, the system literally runs itself . . . "

The software, which includes about 150 programs, cost about $14,000, he said, and the system itself cost about $45,000.

No Changes

Not a single change has been needed in the operating system in the 14 months since the Basic/Four was installed, although Pearse has changed some of the applications programs, he said. The office manager will be trained in Basic programming this summer to enable him to make changes as they become necessary.

The company now owns a total of 6 removable disks and one fixed disk, with all of them pretty full. But the system itself has the capacity to do four times more work, which gives Pearse-Pearson lots of growing room, he said.

The Basic/Four system uses a Microdata processor, a Centronix printer, Hazeltine CRTs and Caelus disk drives.

Networks Economically Access Expensive Data Bases

By Nancy French
Of the CW Staff

PHILADELPHIA – Unless an organization has access to computing power, it is at a distinct disadvantage today, and networks are one way of getting that power, Dr. James Emery, executive director of the Planning Council on Computing in Education and Research at Educom, Inc., said.

Addressing a workshop at the Computer Caravan here, Emery predicted that "the need for access to expensive software and such sophisticated data bases as econometric models or chemical properties will be the primary motivation for network sharing in the future.

"Load leveling – where computing work load is shifted dynamically to take advantage of peaks and valleys in computer use – will be an important benefit to be gained through networks," he added.

"Great economies can be achieved by the user who can meet his base load requirements relatively inexpensively, while shifting peak loads and more sophisticated requirements to another system via a network when necessary," Emery said.

Relatively few universities, or businesses for that matter, want to maintain their own sophisticated data bases, thus encouraging the development of clusters of specialized data bases and services that will be sold and bought, Emery said.

Dr. James Emery

Finally, economies of scale in hardware can be achieved and sometimes exhausted by networking, even on a regional level.

"While national networks are administratively very simple to operate, network responsiveness to user needs is not so simple to achieve," Emery said. A distributive network where the market mechanism – that is, price – is used to ration resources will be the best answer, he said.

"But the fruits of networks will not be fully achieved until we solve three basic problems," according to Emery. Those problems include the behavioral problem, or the "not-invented-here syndrome"; the difficulties arising from poor documentation in remote computing; and the lack of incentive in servicing remote users, especially in the university environment.

Perhaps more serious than these difficulties, however, is "the classic information-retrieval problem." Emery compared this to "the difficulty faced by the librarian trying to match the resources of the library to the often ill-defined problem expressed by the user."

All these problems can be solved, Emery said. The information-retrieval problem will be greatly alleviated with interactive terminals to permit some user browsing.

Packet-switching technology is one of the best ways to beat the high, fixed cost of maintaining ones own lines, paying, instead, for the amount of information transferred. Telenet, patterned after the U.S. Air Force's Advanced Research Projects Agency (Arpa) network, holds great promise from a cost standpoint since distance is rendered nearly irrelevant.

"Until packet-switching networks provide broad-band transmission that allows shipping around data bases, however, users who are tied to relatively sophisticated data bases will not be able to utilize them. Development of such national networks will be slow, Emery predicted.

"Packet switching's indifference to distance is a great advantage, he said, making people feel as comfortable sharing from one coast to the other as they do from one town to the next."

With every crucial element duplexed or better, packet switching has a high level of reliability. "The system is not dependent on any one link or piece of hardware," he noted. This kind of reliability is especially critical for systems such as reservations for hotels or other similar commercial applications, he said.

A further advantage of packet switching is its flexibility to serve any kind of terminals, he said. The system merely requests the terminal to identify itself and then translates the code at either end of the transmission for a terminal that doesn't use that coding," he said.

But the privacy and security problems are real ones, Emery said.

Other administrative problems involved in managing networks concern defining and standardizing service and pricing and price-related questions, he said.

"Networks provide national and international resources, he said, and, in that environment, the balance-of-payments problem arises." That same problem occurs between universities or even businesses, he said, when one buys more outside services than it sells.

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COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Privacy Act of 1974 Marks 'End of the Beginning'

By Nancy French
Of the CW Staff

Limited as it is, the Privacy Act of 1974, passed in the closing days of the 93rd Congress, is the culmination of nearly 10 years of congressional investigation into abuses Americans have suffered from unregulated, mismanaged, personal information-collecting systems.

The story begins in the '60s with the widespread availability of new computers and the accompanying ability to collect and store vast amounts of data. Managers in both the public and the private sector began using them to maintain data files of personal information with little thought to the consequences.

Insurance companies, credit reporting agencies and others built computerized files on individuals, often based on information gathered surreptitiously from neighbors and other third-party sources. The resulting slanted information was stored in computer banks that were off limits to the very people about whom the information was collected.

The situation reached explosive proportions with the proposal for a national data center, dreamed up in about 1974 by the Bureau of the Budget (now the Office of Management and Budget).

The national data center would have linked together the information activities of many government agencies.

Congressional machinery went into motion. Under the leadership of Rep. Cornelius Gallagher (D-N.J.), hearings focused public attention on the privacy aspects of the proposal.

Congressional response was so negative, by the time the hearings were completed, the Budget Bureau had pledged no national data bank would ever be established without specific authorization from the U.S. Congress.

About the same time, concern over the use and misuse of computerized information systems arose in the National Academy of Sciences, and Columbia University law professor Alan Westin was appointed to head a committee to study the problem.

Westin's findings, published in "Data Banks in a Free Society," surprised many. "The powers and capabilities of most computer systems were vastly overrated," Westin found.

The cost and complexity of computerized information was of the most general type, "skimmed off the top," Westin said. The more sensitive information was still kept in manual files.

Westin did warn, however, as costs decreased, computer use and, in particular, data sharing would increase.

During the Senate hearings on data banks in October of 1970, Sen. Sam Ervin (D-N.C.) initiated a study into the Army's civilian surveillance activities. Findings released two years later revealed files on civilian political antiwar activists in more than 350 army installations.

Meanwhile, in the House Banking and Currency Committee's Subcommittee on Consumer Affairs, the Fair Credit Reporting Act of 1970 was drafted and hearings held.

The first fair credit act was passed that year, and it was the first federal law to guarantee individuals limited access to their own credit records. Amendments added later even allowed consumers to see their own files.

In June of 1972, a companion bill, called the Citizens Privacy Act, cosponsored by Rep. Ed Koch (D-N.Y.) and Sen. Birch Bayh (D-Ind.) was introduced to require government agencies to observe fair information practices, notify citizens of the existence of computerized files and get consent from individuals if agencies were to establish new files.

Concern also was mounting on the state level. Study groups were launched in California, Iowa and Massachusetts.

The state of Massachusetts refused to participate in the National Crime Information Center's Computerized Criminal History (CCH) system.

When the Federal Government retaliated by withholding funds from the Small Business Administration, Massachusetts filed suit. Attorney General Elliott Richardson intervened, and the matter was temporarily resolved, but Massachusetts never did join the CCH or even computerize criminal history files.

In Colorado, the state Supreme Court barred compilation of arrest records of persons not convicted of crimes. And the Court of Appeals for the District of Columbia ruled the Federal Bureau of Investigation had no authority to continue to maintain a record on Dale Menard, who had been arrested on suspicion of burglary some years before but never charged.

But, as 1972 drew to a close, legislation was not even close to being passed. Privacy legislation had become a test of wills. It simply would cost too much money, and users resisted.

The findings of the Health, Education and Welfare (HEW) Secretary's Advisory Committee on Automated Personal Data Systems, issued in August of 1973 after a year of hearings, gave the privacy cause a big boost.

Historical Perspective

The HEW committee established for the first time a few general principles for the collection of personal information: no secret files should exist, individuals should have access to files on themselves and the right to correct such files if incorrect; the individual should have the right to know how such information is to be used by the recordkeeping organization, and, finally, citizens should have the right to prevent information gathered for one purpose from being used for another.

Based on the committee's report, congressmen all over Capitol Hill began drafting privacy laws.

In the Senate, the effort was led by Sen. Sam Ervin. In the House, liberal Ed Koch and conservative Barry Goldwater Jr. (R-Calif.) joined forces.

Then Vice-President Ford was appointed to head a privacy committee under the Domestic Council Committee.

The 93rd Congress was dubbed "The Privacy Congress," and most observers thought a privacy law would pass before the year was out.

But, as Christmas neared, nothing was forthcoming. Finally, a compromise was struck, and the Privacy Act of 1974 squeaked through two days before Christmas recess.

It passed because all references to law enforcement systems were omitted. It passed because the private sector was omitted. But a law establishing minimum standards for federal agencies will go into effect in September 1975.

Ford improves dealers' parts control "Silent 700" data terminals

Recently, Ford Motor Company decided to upgrade the communications network used to communicate parts inventory and managemant accounting data between its Dearborn, Michigan Computer Center and the nationwide network of Ford and Lincoln-Mercury dealerships.

This network is a crucial part of two services that Ford offers to its dealerships . . . Automated Inventory Management (AIM) and Computarized Managament Accounting (CMA). Dealers subscribing to these two services receive extensive parts inventory control reports and a wide spectrum of accounting and management information reports.

Striving to improve service to its dealers, Ford wantad more efficient data entry, simpler operating proceduras, and greater accuracy than was offered by the existing mechanical taletypewriters. For this purpose, TI data terminals operating with fast, accurate magnetic tape cassattas offered the best alternative.

"Silent 700®" Automatic Send-Receive and Programmable Data Tarminals from Texas Instruments provided the answers. According to a spokesman for Ford's Dealer Computer Services, "These terminals will provide major advancements through increased equipment reliability, data preparation efficiency, and improved data transmission integrity."

Improving man's effectiveness through electronics

Will Be Honored at NCC

Iverson Named Recipient of Harry Goode Award

MONTVALE, N.J. – Dr. Kenneth E. Iverson, manager of the APL Design Group at IBM's System Development Division, has been named the recipient of the 1975 Harry Goode Memorial Award. The award will be presented at the 1975 National Computer Conference (NCC) luncheon on May 20 in Anaheim, Calif.

And at the industry luncheon on May 22, John E. Sheehan of the Board of Governors of the Federal Reserve System will address NCC attendees.

"For more than 20 years, Iverson has played a key role in the furtherance of computer science and, in particular, was responsible for devising APL – a major data processing language which has led to new directions in programming," Dr. Robert Johnson of the award committee said.

Iverson joined IBM's Computer Science Department at the Thomas J. Watson Research Center in 1960. During the period from 1964 to 1969, he led the project that resulted in the development of a computer system for executing programs written in APL.

The Harry Goode Memorial Award was established in 1964 by the American Federation of Information Processing Societies (Afips) to honor individuals who have made pioneering contributions to computer science and information processing.

Sheehan, formerly president and chief executive officer of Corhart, a subsidiary of Corning Glass Works, was confirmed as a member of the Federal Reserve System's Board of Governor's on Feb. 7, 1972.

Societies/ User Groups

"In view of current unstable economic conditions and recognizing the rapidly increasing role of computers in such areas as banking, electronic funds transfer and long-range economic forecasting, we are confident the governor's appearance will add substantially to the relevance of this year's gathering," a spokesman noted.

Privacy Symposium Planned

SCOTTSDALE, Ariz. – Computer security and privacy will be the issues at a Honeywell-sponsored symposium for computer users to be held here April 29-30.

Registration is $350 per person, which includes the cost of the symposium, two luncheons and a copy of the proceedings.

For additional information contact Jerome Lobel, Honeywell Information Systems, P.O. Box 6000, M.S. A79, Phoenix, Ariz. 85005.

SMIS Members Get Entry to Info '75

NEW YORK – The annual conference of the Society for Management Information Systems (SMIS) will be held concurrently with Info '75 on Sept. 8-11 in New York City.

The two conferences will be independent of each other, but a number of sessions devoted to management will be conducted jointly. All SMIS members will be admitted to Info's exposition, which will take place at the New York Coliseum, without further charge.

Gerald M. Hoffman, former SMIS president, said "the exposition offers a new dimension to our annual conference. Our members will not only have the advantage of the exchange of ideas at our conference sessions, but also the opportunity to inspect hardware and see the results of software programs."

More information on the SMIS conference is available from Richard E. Dooley, Stuart School of Management & Finance, Illinois Institute of Technology, 10 West 31 St., Chicago, Ill. 60616.

and management accounting with from Texas Instruments.

Operating Simplicity
Reusable magnetic tape cassettes – easily edited, corrected and retransmitted – along with proven reliability, place the "Silent 700" ASR and Programmable Terminals far above those of conventional paper tape terminals in capturing inventory, management and accounting data. Built-in intelligence enables these "Silent 700" terminals to guide operators in their data entry procedures, check the data for correctness and format before recording it on tape . . . and later monitor data transmission to Ford's Dearborn computer facility.

And, all this is done with powerful performance features at a reasonable cost per unit . . . which means continued cost-effective communications for Ford and its dealers.

Data communications applications, like this challenging one at Ford, call for a wide range of capabilities in devising solutions. Texas Instruments has this capability . . . to serve you.

Other models from the Texas Instruments line of "Silent 700" data terminals

"Silent 700" data terminals combine with "EMS II" to form powerful data communication systems . . . for cost-effective applications

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TEXAS INSTRUMENTS
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Hopewell Made Head Of Compcon Program

SILVER SPRING, Md. – Lynn Hopewell has been named program chairman of the IEEE Computer Society's Compcon Fall '75 conference, which will be held in Washington, D.C., on Sept. 9-11.

Hopewell is vice-president and director of Network Analysis Corp.'s Washington operations.

Hopewell and General Chairman Richard E. Merwin of the U.S. Army BMD Program Office said they plan to organize sessions in three disciplines – systems, software and hardware – to advance the conference theme, "How to Make Computers Easier to Use."

Call for Papers

SIGUCC USER SERVICES CONFERENCE III, Nov. 10-12, Cherry Hill, N.J.
The objective of the conference will be to discuss how the user services in a university computing center will most effectively serve the academic and/or administrative needs of the user communities in light of hardware configuration, budget restraints and new approaches to user services.
Suggested topics include user services as seen by the director, systems and operations group, central administration and the user; new directions in academic computing; directions for user education; and documentation.
As notice of intention to submit a paper and the topic must be sent by March 31 to Jean Bonney, conference chairman, CCIS, Hill Center, Busch Campus, Rutgers University, New Brunswick, N.J. 08903.

Calendar

April 17-18, San Francisco – ACM Pacific '75 Regional Conference. Contact: ACM Pacific '75, P.O. Box 2754, 94126.

April 21-24, Atlanta – Univac Users Association Spring Conference. Contact: B.J. Frable, Sperry Univac Division, Sperry Rand Corp., P.O. Box 500, Blue Bell, Pa. 19422.

April 23-25, Washington, D.C. – International Optical Computing Conference. Contact: Optical Computing, P.O. Box 639, Silver Spring, Md. 20901.

April 27-30, Dallas – Nucon '75, the fifth annual meeting of NCR computer users. Contact: R.H. VanDenburg Jr., Charter Services, Inc., P.O. Box 26363, Richmond, Va. 23260.

April 27-30, Detroit – 1975 Annual Conference of the Association for Systems Management (ASM). Contact: R.B. McCaffrey, ASM, 24587 Bagley Road, Cleveland 44138.

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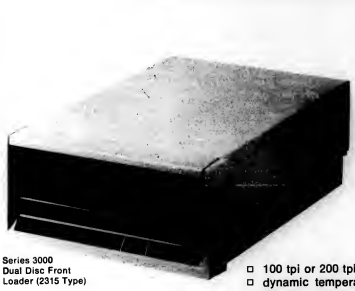

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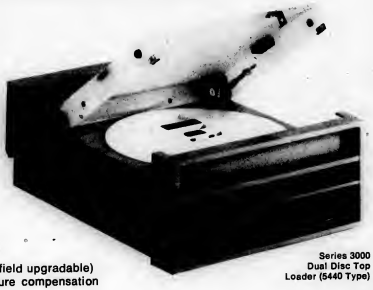
Dual Disc Front
Loader (2315 Type)



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COMPUTER INDUSTRY

CI Notes

CDC-Rumanian Joint Venture Starts Printer Production

BUCHAREST, Rumania – Production of computer printers has begun at the plant here of ROM Control Data SRL, established as a joint venture by Control Data Corp. and the Industrial Group for Electronics and Vacuum Technology in the Rumanian Ministry of Machine Tools and Electro Techniques (CIETV).

The plant employs 130 persons.

Initial shipments are scheduled to go to CDC customers in Europe and Africa, with shipments to CIETV customers beginning late in 1975 or early 1976, CDC officials said.

"Progress of the joint venture has been excellent and prospects for its success are encouraging," said Hon. Corneliu Bogdan, the Rumanian ambassador to the U.S.

Univac 90/30 Tops $100 Million

BLUE BELL, Pa. – Bookings for Univac's 90/30 have topped $100 million and are ahead of plan, Univac said.

More than 350 systems have been ordered in the seven months since the system was announced in June through the end of January, said Frank B. Holst, director of program management.

"The entire program for the 90/30 is proceeding on plan with some areas of the program including bookings actually ahead of plan," he said.

Slightly more than half of the orders were obtained from replacements of competitive systems and from new users.

First Eclipses Shipped

SOUTHBORO, Mass. – Data General Corp. shipped its first two Eclipse computers to Loma Linda University in Loma Linda, Calif., a teaching medical center.

The units will be used for computational work in radiation therapy research and in a distributed processing network.

Supershorts

Hewlett-Packard Co. (HP) shipped its 10,000th minicomputer to General Electric Co.'s Reentry and Environmental Systems Division. HP also made its first shipment of 2640A terminals to Longs Drug Stores, Walnut Creek, Calif.

– – –

Control Data Corp. is closing its Casper, Wyo., plant, where 130 persons are employed to repair the memory stack assemblies used in CDC Cyber 70 and Series 6000 computers.

– – –

Mini-Computer Systems, Inc. (MCS) and Boston Export Sales Corp. have signed an agreement permitting Boston Export to market MCS services and products in Japan.

Major Announcement by '76?

'FS' Death Does Not Preclude New Line

By E. Drake Lundell Jr.
Of the CW Staff

Future Systems (FS) is dead! Long live . . .?

IBM said recently the designation FS is no longer being used, but vehemently denied this move means it is not developing new products.

And, despite British press reports that the decision to drop FS was made early this year, there are several reasons to believe the designation – but not research work on a future line – was dropped even earlier, perhaps as soon as it was made public during the Telex trial.

But dropping the label does not mean a new line is not in the offing, with the major question being when.

Several analysts have speculated the announcement of a new line will be delayed past the expected 1976 or 1977 time period, with several going so far as to say an FS-like system will not be with us until after 1980.

To support this argument, these analysts say there are not enough users experienced with 370 virtual operations to date to provide the base for FS users, and IBM, disappointed in the sales of the 370, will keep it on the market longer.

These arguments make sense at first blush, but some recently developed figures by International Data Corp. (IDC), an industry research firm, tend to refute those claims.

Analysis

First, IDC has found approximately half the users capable of using VS on 370 equipment are doing so, and another 20% or so will convert to virtual operation this year.

Therefore, more than 70% of the users who could be employing virtual are expected to be up and running by the end of this year, giving them plenty of experience for a new system in the 1976 to 1977 time frame.

At the same time, it appears IBM shipments are following their traditional cycle, which will mean the firm should have a new "big-ticket" item to sell in the 1977 time period, when 370 shipments will flatten out.

(Continued on Page 40)

IBM Failure to Meet Bid Date May Leave Federal Market Open

By Nancy French
Of the CW Staff

WASHINGTON, D.C. – Government agencies may no longer be able to buy IBM equipment off the General Services Administration's (GSA) ADP Supply Schedule as a result of that company's failure to submit a proposal before the Feb. 28 cutoff date.

This could open new business opportunities to third-party lessors, maintenance companies and plug-compatible hardware dealers who have had little success in the federal establishment despite extensive business activity in the commercial world.

If GSA cannot devise a way to get IBM on the supply contract, government agencies will be forced to open bidding on all new IBM contracts for upgrades, maintenance and peripherals, starting July 1.

Without IBM on the schedule, agencies wanting IBM products will have to request a delegation of procurement authority (DPA) from GSA and then solicit bids from all those companies, on or off the schedule, who supply the desired IBM hardware, compatible gear or maintenance service in any case where the value of annual hardware rental or purchase price, less maintenance, is $50,000 or more.

In the case of purchased software, the maximum permitted without competitive bidding is $10,000 and, for rental software, the maximum is $7,500. The maximum for maintenance is $25,000.

While sources outside the government confirmed IBM failed to bid, George Dodson, director of GSA's Division of Automated Data Management Services, would not identify the six to eight companies he said had contracts in previous years but failed to bid this year.

But an IBM spokesman said "IBM does plan to do business with the government next year. We have been in discussions with GSA for about a month, but it would be inappropriate to discuss any details of a government solicitation."

IBM did about $180 million in government business last year under the schedule.

Observers speculate whether IBM is using the move to exert pressure on the government, although all are not in agreement as to the precise objective.

To get IBM back on the schedule will require GSA to reopen the bidding, enabling other companies who did not meet the deadline to also submit proposals.

Hospital DP Area Seen Spurting To Annual $1.6 Billion by 1980

WALTHAM, Mass. – Even though hospitals spent $375 million on new equipment and software in 1973, they are relatively undercomputerized compared to industry in general, an International Data Corp.'(IDC) study found.

But things are changing, the report said, predicting that continued strong growth will bring hospital's annual DP expenditures to nearly $1.6 billion by 1980.

To date, little has been done with computers outside the financial and accounting area due to "inertia" born of "decentralized administrative power, lack of business pressures and unfamiliarity with DP capabilities," IDC found.

But pressures caused by skyrocketing expenses and increasing government regulation are forcing a more businesslike approach, according to hospital administrators and other key hospital personnel and suppliers interviewed by IDC.

According to the survey, most hospitals today are processing only financial applications and spend anywhere from zero to $3/patient day in DP.

The addition of data collection/communications systems would increase DP budgets to $2.50- to $5/patient day, the study found.

But once the barriers containing information processing within the accounting office are overcome, hospitals will begin to find many other application areas that can justify spending up to $6/patient day – and in some cases as high as $10/patient day.

Hospital Market

Hospitals are not a huge market, the survey pointed out. Of the 7,000 hospitals in operation in the U.S. today, only about 1,450 are large enough, have a high enough turnover rate or enough diagnostic tests to make them prime candidates for new systems, the study said.

Primary growth lies in the turnkey services and combined systems for the next few years, the report predicted.

Current and planned applications anticipated in medium to large hospitals will be laboratory, pharmacy and communications applications, the report said.

Of 72 responses tabulated, 22% indicated they had had laboratory applications in 1974, but 69% reported plans for automation by 1979.

HP 2640A CRT Orders Double the Projected Rate

By Molly Upton
Of the CW Staff

CUPERTINO, Calif. – Orders for Hewlett-Packard Co.'s (HP) 2640A CRT terminal have more than doubled the projections for sales in the two and a half months since its introduction, according to Bob Kadarauch, terminal product manager for the Data Systems Division.

This 2640A is ready for shipment.

There is little doubt there will soon be other models of HP CRT terminals. A sign in HP's newly enlarged manufacturing area here reads "264X," readily adaptable to a new line.

HP compares the somewhat unexpected initial performance of the 2640A with its first handheld calculator. The value of orders received in the products' first quarter is equivalent, and the calculator led to a profuse family of hot-selling items.

Backlog for the 2640 is currently $1.5 million, Kadarauch said.

HP is prepared to treat the CRT as a seperate product from its mini business, he said, noting the CRT market is wider than the mini market.

There would then be no inhibitions about marketing a "smart" terminal that might impinge on the mini market. This assumes the regular HP criteria about entering a new market can be met and HP can make a technological contribution.

HP currently regards the 2640A's principal competition as AT&T's Dataspeed 40.

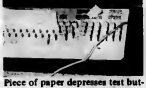
Kadarauch broke down the CRT market into five areas of capability, ranging from glass, block transmission, editing and format and local mass storage to user-programmable. The current 2640A extends into the block and edit and format areas.

The next step is the addition of a 3M cartridge engineered to HP's specifications and currently in the works.

The 2640A is designed modularly, with removable boards and power supply. Final assembly time takes about 20 minutes to integrate the modules, Bill Toney, assembly manager, said.

CW Photos by M. Upton

A row of 2640As stand in expanding assembly line.



Piece of paper depresses test button for continuous self-diagnostics.

'FS' Death Not the End

(Continued from Page 39)

Now that the firm has been restructured with the System/3 and the System/32 being handled by a separate marketing force, IBM will be hard-pressed to reduce internal pressures from salesmen when the growth of 370 shipments slows in 1977 as expected.

So, despite rumors of the death of FS, it seems likely IBM will make some major new announcements during 1976 or 1977.

Rather than introducing a whole new line, however, IBM could announce significantly enhanced 370 systems to gently lead the user to the architecture to come.

This could include more integrated controllers that make paging easier and leave less equipment exposed to outside vendors. It could include complete systems with controllers and hierarchical disk memory all in one package, some observers indicated.

Terminal Performance Soon Leaping in Future

TORONTO – Over the next few years, the intelligent terminal industry will produce "quantum jumps in performance," along with incremental cost savings, according to T.J. Smith, executive vice-president of Sycor, Inc.

Smith predicted that as communications costs are reduced, the use of terminals will produce "unexpected" and "creative" applications with "networks the keyword."

Addressing the Canadian Information Processing Society's 1975 seminar on intelligent terminals and their uses, Smith described the future look of networks as a "host computer, with intelligent terminals and subsystems at each remote site.

"A second network will develop at each site where intelligent machines on a local loop collect and distribute data and text," he predicted.

Smith also noted file storage in offices remote from the computer mainframe is the first step in the progression.

"The quarter-million-byte floppy disk will be supplemented by 2M- to 10M-byte, low-cost disk files which will make even stand-alone terminals very powerful," he said.

Smith cited the growing importance of the on-line intelligent terminal. "By performing programmable, preprocessing functions locally, it lessens the volume of transmissions and retransmission, reducing communications and host processor costs."

Combining word processing and data entry on the same machines and subsystems is another step in the continuing evolution of technology, according to the Ann Arbor firm's executive vice-president.

"The distribution of text and data locally and nationally, via these networks, will follow," he said.

He also noted the real possibilities in the area of electronic mail.

May Conference Set To Focus on Semis

SAN MATEO, Calif. – The technical program for Semicon/West 1975, which will be held May 20-22 at the county fairgrounds here, will feature discussions on wafer processing, interconnection packaging and assembly and new developments in semiconductor technology.

On Thursday, May 22, several papers will be given that relate to present and future technologies.

The last session, also on Thursday, will consist of papers on bubble domain memories, high-density bipolar technologies and applications, as well as recent SOS technology advances and applications. There will also be a review of MNOS technology.

Semicon/West '75 is sponsored by the trade association, Semi. Preregistration is $1. Semi is at 625 Ellis St., Suite 212, Mountain View, Calif. 94043.

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IBM System 32	33,100		None
Quantel Systems	30,975		None
General Automation 130/1	29,500		Will compatibly field-expand into a family of more powerful systems.

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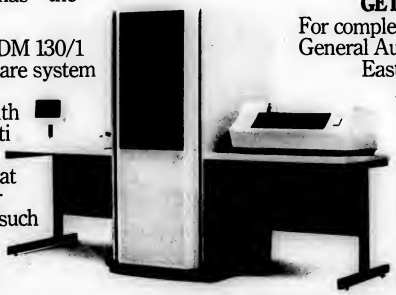

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DATA MANAGEMENT SYSTEMS BY
GENERAL AUTOMATION

Use of Key-to-Disk Systems Climbing in UK, France

LONDON – The UK and France are among the forerunners in data entry usage in Europe, although in neither nation has the decline of the keypunch been as rapid as predicted, according to *EDP Europa Report* (EDP/ER).

In both countries, mixed systems predominate and users, in efforts to eliminate sources of error, are turning increasingly to key-to-disk systems and telecommunications systems, the newsletter indicated.

Key-to-disk systems have been especially popular with French users. In terms of unit stations, the market share held by key-to-disk suppliers has risen from about 1% at the end of 1972 to 32% at the end of 1974, said the newsletter, quoting a study by IDC Europa Ltd.

Terminal Market

The terminal market has grown less spectacularly, from about 35% of total keystations in 1972 to 51% at the end of 1974.

In France, the independent data entry suppliers ranked higher than they did generally in the UK in terms of site penetration of all data preparation equipment.

IBM leads, with 56% of the French market, followed by Computer Machinery Corp., 26%; Inforex, 25%; and Singer, 10%. Mohawk Data Sciences (MDS) has 9% of the market, followed by Univac, 5%, and Siemens, 4%.

In the UK, IBM again is the leader with 32%, followed by International Computers Ltd., 14%, Univac, 10%; and MDS, 8%.

NCR and Olivetti are tied, each with 4% of the market, while Singer and CMC each have 3%. Honeywell has 2%, while Redifon, Tally and Inforex each have 1%. Kode and Consor have 2% and 1% respectively.

Consistent with users' criteria of several years ago, users still attach little importance to the "image" of the vendor, although they are concerned with a firm's viability, EDP/ER said.

Equipment performance and productivity topped users' list of important reasons for changing to a new system, according to the newsletter.

Reliability ranked second, although 2% of users indicated performance and productivity were unimportant, and 4% weren't interested in reliability.

French users are generally more cost conscious than their British counterparts, the report noted.

Most users indicated major problems stemmed from the human factor of data preparation, possibly in conjunction with document design.

Of the 46% of UK users who mentioned source data error as a major problem, a majority noted errors were often caused by poor document design.

Human error ranked second, 24%, among UK users as a major problem; 22% cited document design; 21%, machine reliability; and 18%, equipment performance.

About 80% of the users who experienced no problem with human errors had key-to-disk installations; the other 20% were terminal users, the report said.

Among French users, 76% listed human error as a major problem, while 53% named source data error. Document design was mentioned by 36%; followed by equipment performance, 27%; and machine readability, 14%.

Singer and Univac users cited maintenance as a problem, while IBM, Singer, Univac, MDS and Inforex were all criticized for problems with equipment performance, according to the newsletter.

International News

MAI, Basic/Four Add Foreign Unit

TUSTIN, Calif. – MAI International Corp. and Basic/Four Corp. have formed Basic/Four International to open markets not presently serviced by MAI International.

Eight distributor agreements covering 10 nations have been signed, representing at least $12 million in commitments over the next three years, the firm said.

Distributorships cover Austria, Yugoslavia, Spain, Portugal, the UK, Czechoslovakia, Hungary, France, Nicaragua and Panama.

MAI International operates directly in Belgium, Canada, Costa Rica, West Germany, Mexico, The Netherlands, the Phillipines, Puerto Rico, Switzerland and Venezuela.

Dacoll Distributing Terminals in U.S.

LONDON – Dacoll Engineering Ltd., a British terminal manufacturer, will start distributing its products in the U.S. this month.

The firm is currently prospecting for area distributors.

Dacoll markets the DL180 terminal system, which incorporates a matrix printer that prints up to 180 char./sec.

The range includes automatic send/receive and keyboard send/receive models, a microprocessor version, a remote job entry terminal and models that act as emulators for IBM 2780 and ICL 7020 terminals, the firm said.

Foreign Orders & Installations

Daini-Seikosha Co. Ltd., a Japanese watch manufacturer, has installed a Univac 1106 for use in production control.

Cable and Wireless Ltd. of London, a telecommunications company, has ordered SPD 320 and SPD 900 intelligent terminal equipment from Incotern Corp.

The Public Service Board of South Australia, the information processing bureau for the South Australian state government, has ordered a second Control Data Corp. Cyber 70 Model 73 to operate back-to-back with a CDC Cyber 73 installed two years ago.

General Accident Corp., with offices in the UK and Southern Ireland, has ordered two Series 810 microprocessors and 14 display terminals from Sanders Data Systems Ltd.

The German Federal Postal Administration has ordered 49 NCR 399 computers, five of which have communications capability.

Iberia Airlines has ordered a dual-processor Univac 494 for reservations and a Univac 1110 multiprocessing system to handle commercial DP requirements. The units will replace two IBM 370/155s and three Siemens 4004/135s.

In Australia

Small Users Target of Honeywell 6

SYDNEY, Australia – Honeywell's foray into the small business systems market here through its offering of the Nippon Electric Co.-developed System 6 is directed at first-time users and those requiring decentralized processing capabilities [CW, Feb. 25].

The System 6 is upward-compatible with other Honeywell units and offers interface capabilities with other makes of computers. Standard software handles on-line communications in Honeywell's Series 60s, Datanet 2000 front-end processors and 16-bit mini range.

The unit will initially be available for purchase only or to third-party lease. Honeywell expects the System 6 group will be self-sufficient by year end, excluding start-up investment, according to Paul Tucker, Honeywell's regional director, Pacific operations, as reported recently in *Computer Weekly*.

The System 6 is available in three functional entry levels: a billing system with 16K bytes main memory for $24,072; a disk system with 24K bytes of main memory and a 4.9M-byte disk for $47,600; and a transactional system, which includes 32K bytes of main memory, for $69,632. Prices include systems software and support, according to the report.

For a one-time charge of $5,440, a customer can obtain development of applications software.

The operating system is based on Honeywell's Gcos, and programming languages are Cobol and Best, described as a simplified subset of Cobol.

Japan Firms Add 370-Like Models

TOKYO – Two major domestic manufacturers, Fujitsu and Hitachi, are moving into the world market dominated by the large IBM 370s, but they're doing so without touting their compatibility with those machines, according to *EDP Japan Report*.

The IBM market is a logical target since it amounts to about 60% of the total. With the Japanese marketplace being only one-ninth the size of the U.S. in value of equipment, the two firms are casting about for other markets.

International News

In addition, in Japan, the three major manufacturing groups market 19 models, according to the report.

Fujitsu is developing the M-1, which is said to be equivalent to a 370/145, and the M-2 from Hitachi is said to be in the 370/158 range.

But Hitachi also has the M-3 or M-180, claimed to be 20% more powerful than IBM's 370/168.

The M-4 or M-190, said to be three times as powerful as the 168, is being developed and marketed by Fujitsu with aid from Amdahl Corp. It is said to be able to use 168 software.

'A Powerful Image'

Takuma Yamada, director of Fujitsu's Information Processing Systems Group, explained the decision to enter the larger machine market first.

"Medium-size-class machines such as those equivalent to the IBM 370 Models 135 and 145 might be more profitable since this particular segment of the market holds the largest shares among the total computer market. But we decided to market the largest model first in an attempt to establish a powerful image among potential users."

Instead of campaigning on the basis of IBM compatibility, the manufacturers plan to hold off until the machines are up and running and compatibility has been proven.

And, sources indicated, the Ministry of International Trade and Industry has requested Fujitsu and Hitachi not to publicize the full compatibility.

After HP Licensing Agreement

Interest Up in Photophysics Copier

By Molly Upton
Of the CW Staff

MOUNTAIN VIEW, Calif. – The recent technology licensing agreement with Hewlett-Packard Co. (HP) [CW, Feb. 12] has brought a flurry of inquiries to Photophysics on its CRT copier, Dallas L. Talley, president, claimed recently.

The company, which has been "in a survival mode" since last July, is seeking to expand its OEM and licensing business. The firm had previously done only limited marketing of its product, he said.

Image Copier

The unit, which produces a copy of the CRT image in about one second, hooks into CRTs through a coaxial cable. The quality of the image on the paper is determined by the quality of the CRT image, Talley said.

Photophysics makes the copier in two sizes, producing a 4-in. by 5-in. sheet of paper for about 2 cents a copy or the 8-1/2- by 11-in. output for under 5 cents a copy.

Prices, in lots of 50, are about $2,000 for the small unit and $3,000 for the larger.

CRTs may be multiplexed with the copier, and Talley said some customers have as many as 12 linked to one copier.

However, a Photophysics unit cannot be linked to an IBM 2260 without some adjustment, he noted. Some users have requested units to be used in conjunction with their 2260s, but Talley said Photophysics declined to make the adjustment.

Variety of Applications

The printer copiers can be used in a variety of applications. RCA has them installed in its automatic bowling scorer so players can obtain a copy of their scores, Talley noted.

Talley foresees the units being used in retail applications, such as consumer guidance. A shopper could ask questions on a CRT and receive a copy of answers to his particular questions.

Facsimile makers have expressed interest in the units, Talley said, since they transfer the image so quickly. Units can also be used to capture contents on a reader of microfilm or microfiche.

Medical applications are still another area. Currently, the firm has contracts with four medical firms: Media Systems, Jonathan Systems, Abbot Laboratories and Mennan Greatbatch, he said.

The international arena "looks very good" he said, noting some developing countries could use the unit in conjunction with educational TV programs.

Talley said since the equity market has dried up, an alternative method of financing new firms and/or firms with new technology will have to evolve, he said.

Currently, venture capital firms seem to be reserving their funds to maintain those firms in which they already have substantial investments, Talley added.

'Pioneer Day' Set As NCC Feature

MONTVALE, N.J. – A special "Pioneer Day" will be held May 21 at the 1975 National Computer Conference (NCC) to honor those scientists, philosophers, mathematicians, engineers and meteorologists who worked with Dr. John von Neumann on the Electronic Computer Project at the Institute for Advanced Study (IAS).

Prototype

"This particular group was chosen in recognition of their work on the development and application of the IAS machine – one of the first stored-program computers. The machine was the prototype for many other first-generation computers and the applications work, especially in meteorology, led to significant advances in the computer industry," a conference spokesman said.

A special award will be presented to the institute in recognition of this project, with members of the task force participating. There will also be a 3-1/2-hour program covering the historical and engineering aspects of the project.

Asian Institute Gets Regional DP Center

BANGKOK, Thailand – A multimillion dollar regional computing center is being established at the Asian Institute of Technology (AIT) with funding from the IBM World Trade Americas/Far East Corp. and assistance from the U.S. Agency for International Development.

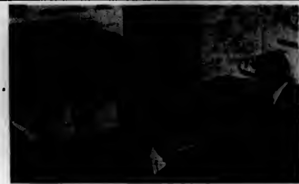
The center will assist in educational programs and "undertake results-oriented projects of particularly critical importance to the countries of Asia," according to Dr. John A. Hrones, president of the AIT Foundation, Inc.

Projects

Projects the computing center will be involved in include human settlement planning, flood control, agriculture and natural resources.

"Through these efforts," Hrones said, "we expect the new center will contribute in a major way toward the future development of Asia."

The center is expected to be in full operation in 1976.



First Time in Japan

Attendees of the American Computer Technology '75 exhibition in Tokyo gather at the Interdata, Inc. booth to observe the Model 7/32, shown for the first time in Japan. Forty-two U.S. exhibitors displayed their products at the exhibit, sponsored by the U.S. Department of Commerce.

O'Brien Takes MDS Helm

UTICA, N.Y. – Mohawk Data Sciences Corp. (MDS) has found a new president, following several management changes during previous months. Ralph H. O'Brien was named president, chairman and chief executive officer.

He replaces James W. Hart, who was interim president and chief executive officer following the resignation of V.E. Johnson, founder.

Four directors resigned from the board: Richard L. Karpen, executive vice-president; Daniel van der Plassche, president of MDS International Service Corp.; and outside directors Robert Groben and Herbert Roth Jr.

Karpen and van der Plassche will continue in their executive positions.

Woo Leaves ISS

CUPERTINO, Calif. – Everett T. Bahre has been appointed vice-president and general manager of Sperry Univac's Information Storage Systems (ISS), succeeding James J. Woo, president since 1971 and a founder of the company.

Other Moves

■ Robert J' O'Brien has been named president and chief operating officer of Rapidata, Inc., following the resignation of Stewart B. Gold.

■ Ernest L. Hillman has been named vice-president of hardware engineering at Western Union Information Systems.

■ John K. Byerlein has been named vice-president and Geoffrey Salkeld has been appointed vice-president of finance at Computer Automation, Inc.

■ Martha W. Griffiths and Dr. Otto Eckstein have been elected members of the board of directors and Frank C. Haskell has been appointed corporate vice-president at Burroughs Corp.

■ Dennis A. Cross has been elected chairman of Diva, Inc.

Executive Corner

■ Henry Caplan has been appointed president of Leasco Response, Inc.

■ Seymour Kraut has been appointed vice-president of Honeywell's Phoenix computer operations and C.A. Conover was named vice-president, plans and programs.

■ Frederick J. Anderson has been appointed vice-president of corporate development and programs at GTE Information Systems.

■ Robert G. Walden has been appointed executive vice-president and chief operating officer of Compucorp.

New Registrations

HONEYWELL FINANCE, INC., Honeywall Plaza, Minneapolis, Minn. 55468, e financier for customer obligations of Honeywell Information Systems, Inc., field to register $75 million of debentures, due 1981. Underwriters era Blyth Eastmen Dillon & Co., Inc. end White, Weld & Co., Inc.

BURROUGHS CORP., Detroit, Mich. 48232, e designer of business equipment, filed to registar 395,000 shares of common in connection with e merger of e wholly owned subsidiery of Burroughs into Grephic Sciences, Inc. No underwriter is involved.

THE TELEX CORP., 6422 East 41st St., Tulsa, Okla. 74135, e computer manufecturer, filed to register 237,750 shares of common which may be issued by the company from time to time when outstanding options granted to employees become exercisable in accordance with their terms. No underwriter is involved.

Position Announcements

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The ideal candidates for the positions of SYSTEMS PROGRAMMER will have a Bachelor's degree and at least 4 years experience. They will have a thorough knowledge of assembler and be familiar with OS/VS internals. Experience with OS/VS2 – HASP II – TSO is desirable.

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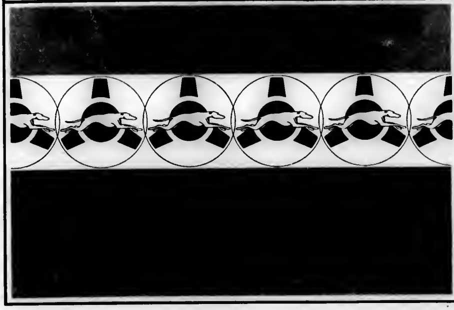

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Partially because of the discrepancy in size of tax credits available, the 1974 net income at Rapidata totaled $514,237 or 28 cents a share compared with $741,234 or 40 cents a share in 1973.

The tax credit available in 1974 was $55,000 compared with $161,000 in 1973.

For the quarter, though, earnings improved to $184,590 or 10 cents a share compared with $72,161 or 4 cents a share in the same period last year, despite the tax credits, which amounted to $19,000 in 1974 and $101,000 in the 1973 period.

Revenues also increased to $3.1 million from $2.6 million in the year-ago period.

At Keydata, earnings for the second quarter totaled $102,000 or 4 cents a share compared with $92,000 or 3 cents a share in the same period last year.

Results for 1974 were restated to reflect a change in accounting to expense marketing and product development costs as incurred.

Revenues rose to $3.3 million compared with $2.9 million in the same quarter last year.

For the six months, Keydata earned $136,000 or 5 cents a share including a $61,000 tax credit compared with $363,000 or 13 cents a share for the same 1974 period, when there was a $171,000 tax credit.

Revenues rose to $6.4 million compared with $5.8 million in the same period last year.

CSC Nine-Month Earnings Double; Growth of Infonet Large Factor

EL SEGUNDO, Calif. – With help from Infonet, Computer Sciences Corp.'s (CSC) nine-month earnings were double those of the year-ago period.

Earnings totaled $2.4 million or 17 cents a share compared with $1.1 million or 8 cents a share in the same period last year.

Revenues reached $128.1 million compared with $106.2 million a year ago.

Infonet, the firm's nationwide time-sharing network service, had operating earnings before taxes and corporate charges of $5.3 million compared with $652,000 in the same nine months last year.

Infonet revenues for the nine months were up 60% to $26.8 million compared with $16.8 million.

Contract services revenues topped $100 million for the first time in a nine-month period, totaling $101.2 million. But operating earnings for contract services for the nine months were less than those of last year primarily due to reduced earnings from computer leasing operations, $6.6 million compared with $8 million.

In the third quarter, CSC revenues totaled $45.8 million compared with $36.3 million in the year-ago period.

Earnings rose to $938,000 or 7 cents a share compared with $698,000 or 5 cents a share in the same period ended Dec. 28, 1973, when there was a $464,000 gain on sale of investment.

CSC President William R. Hoover said the firm is having a good year. "I believe we shall continue to see growth in the major sectors of our business."

Revenues at Storage Technology Rise 33%, Income 16% for Year

LOUISVILLE, Colo. – Storage Technology Corp. reported a 33% increase in revenues and a 16% increase in earnings per share for the year ending December 27, compared with a year ago.

The company's revenues reached $75.3 million, compared with $56.6 million for 1973.

The peripheral equipment maker's net income was $5.3 million or $1.45 per full diluted share, up from $1.25 the previous year.

At $21 million, fourth-quarter revenues also were up a full 16% ahead of the $18.2 million reported a year ago.

Net income for the fourth quarter was $1.5 million, a 27% increase over $1.2 million earned in the comparable 1973 period.

Sycor Income Climbs

ANN ARBOR, Mich. – Revenues and earnings continued to increase during the fourth quarter and year ended Dec. 31 at Sycor, Inc., maker of intelligent terminals.

With revenues from rental and service nearly doubling during the year, revenues rose to $40.1 million compared with $31.7 million last year.

Sales rose to $26.1 million from $24.5 million while revenues from rental and service income jumped to $14 million from $7.2 million last year.

Year Earnings Up

Earnings for the year totaled $5.1 million or $1.82 a share including a $1.8 million tax credit compared with $2.5 million or 94 cents a share in 1973, when there was a $2.1 million charge for the cumulative effect of an accounting change and a $1.6 million tax credit.

During the quarter, revenues rose to $10.7 million from $8.8 million in the same year-ago period.

Earnings totaled $1.4 million or 49 cents a share, including a $374,500 credit, compared with $1.1 million or 43 cents a share in the year-ago period, when the tax credit was $183,300.

Earnings Reports

COMPUTER DIMENSIONS
Year Ended Dec. 31

	1974	1973
Shr Ernd	$.47	$.08
Revenue	10,535,680	8,607,653
Disc Op	a84,773	b66,479
Tax Cred	320,318	103,747
Earnings	715,406	122,923

a-From discontinuance of Command Center operations during the fourth quarter of 1973. b-Consists of a gain from disposition of assets of a subsidiary and a loss from the Command Center operations.

ELECTRONIC ASSOCIATES
Year Ended Jan. 3

	1975	a1974
Revenue	$31,880,000	$33,123,000
Disc Op	12,003,000	4,593,000
Tax Cred	.....	39,000
Loss	31,404,000	3,924,000
3 Mo Shr	.22	.....
Revenue	9,494,000	10,507,000
Earnings	$87,000	(3,407,000)

a-Ended Dec. 28, 1973; restated to reflect discontinued operations. b-Includes loss on disposal of discontinued operations. c-Loss.

GREYHOUND COMPUTER
Year Ended Dec. 31

	1974	1973
Shr Ernd	$.22	$.64
Revenue	62,128,000	45,642,000
Earnings	a952,000	2,768,000
3 Mo Shr	.....	.19
Revenue	12,423,000	12,234,000
Earnings	a(128,000)	822,000

a-Includes gain from sale of investment.

REDACTRON
Three Months Ended Dec. 31

	1974	1973
Shr Ernd	$.08	.....
Revenue	5,589,967	$3,458,480
Tax Cred	48,600	.....
Earnings	92,234	(397,971)
6 Mo Shr	.11	.....
Revenue	10,534,580	6,798,028
Tax Cred	61,300	.....
Earnings	126,743	(363,325)

SYCOR
Year Ended Dec. 31

	1974	1973
Shr Ernd	$1.82	$.94
Revenue	40,140,500	31,672,000
Tax Cred	1,824,500	1,625,000
3 Mo Shr	.49	.43
Revenue	10,674,400	8,791,200
Tax Cred	374,500	183,300
Earnings	1,375,800	1,149,400

RECOGNITION EQUIPMENT
Three Months Ended Jan. 31

	1975	1974
Shr Ernd	$.12	.....
Revenue	a10,285,000	$6,750,000
Tax Cred	541,000	247,000
Earnings	655,000	(1,247,000)

a-Includes revenues of $2.7 million from noncancelable long-term leases.

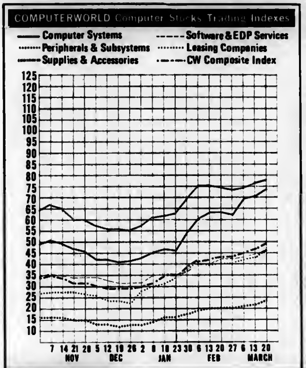
PRIME COMPUTER
Year Ended Dec. 31

	1974	1973
Revenue	$6,529,827	$1,782,876
Tax Cred	9,300	.....
Loss	531,746	1,830,916
3 Mo Shr	.01	.....
Revenue	2,077,012	1,042,205
Spec Chg	a32,864	.....
Earnings	14,629	(306,206)

a-Tax adjustment

DATA 100
Year Ended Dec. 31

	1974	1973
Shr Ernd	$1.57	$1.13
Revenue	69,720,000	42,744,000
Tax Cred	1,786,000	1,397,000
Earnings	4,846,000	3,375,000



Computerworld Stock Trading Summary

CLOSING PRICES TUESDAY, MARCH 18, 1975

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

EXCH		PRICE 1974 RANGE (1)	CLOSE MAR 18 1975	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	62-109	93 7/8	+4 1/2	+5.0
O	COMPUTER AUTOMATION	2- 14	5 3/4	+ 5/8	+12.1
N	CONTROL DATA CORP	10- 35	15 7/8	-1 1/8	-6.6
N	DATA GENERAL CORP	18- 38	23 1/2	+1 3/4	+8.0
O	DATAPOINT CORP	5- 15	12 3/4	+2 1/2	+24.3
O	DIGITAL COMP CONTROL	1- 5	1 1/4	0	0.0
N	DIGITAL EQUIPMENT	46-121	87	+7 1/4	+9.0
N	ELECTRONIC ASSOC.	1- 3	2 5/8	+ 1/4	+10.5
A	ELECTRONIC ENGINEER.	4- 11	7 3/8	+ 1/2	+7.2
N	FOXBORO	19- 48	31	+1 7/8	+6.4
O	GENERAL AUTOMATION	6- 40	7	- 3/4	-9.6
O	GRI COMPUTER CORP	1- 2	1/4	0	0.0
N	HEWLETT-PACKARD CO	54- 91	91 1/8	+3 3/8	+3.8
N	HONEYWELL INC	18- 86	32 1/4	+ 7/8	+2.7
N	IBM	152-251	214 3/4	+1 3/4	+0.8
O	INTERDATA INC	5- 22	22 1/8	0	0.0
O	MEMOREX	2- 5	4 3/4	+ 1/4	+5.5
O	MICRODATA CORP	1- 5	2 1/4	0	0.0
N	NCR	14- 45	25 3/4	+2 3/4	+11.9
N	RAYTHEON CO	21- 39	33 5/8	+1	+3.0
N	SPERRY RAND	28- 48	34 3/4	+ 1/4	+0.7
A	SYSTEMS ENG. LABS	1- 3	2 3/8	+ 3/8	+18.7
O	ULTIMACC SYSTEMS INC	1- 2	3 3/4	0	0.0
N	VARIAN ASSOCIATES	6- 13	9 1/2	+ 3/8	+4.1
N	WANG LABS.	7- 20	11 7/8	+2 1/8	+21.7
N	XEROX CORP	50-127	77 3/8	+1 5/8	+2.1
	LEASING COMPANIES				
O	COMDISCO INC	1- 7	3 3/8	+1 3/8	+68.7
A	COMMERCE GROUP CORP	2- 6	3 3/8	0	0.0
A	COMPUTER INVSTRS GRP	0- 4	7/8	- 1/8	-12.5
N	DATRONIC RENTAL	1- 1	5/8	0	0.0
A	DCL INC	0- 1	1/2	+ 1/8	+50.1
N	DPF INC	2- 5	4 5/8	+ 1/8	+2.7
O	EDM RESOURCES	2- 3	2	0	0.0
A	GRANITE MGT	1- 3	3	+ 1/4	+9.0
A	GREYHOUND COMPUTER	2- 6	2 3/4	+ 1/4	+10.0
A	ITEL	3- 6	6	+ 3/8	+6.6
N	LEASCO CORP	5- 12	7	+ 1/4	+3.7
O	LEASPAC CORP	1- 2	3/4	0	0.0
O	LECTRO MGT INC	1- 1	1/8	0	0.0
O	NRG INC	1- 5	2 1/2	+ 1/4	+11.1
A	PIONEER TEX CORP	2- 10	2 5/8	+ 1/4	+15.5
A	ROCKWOOD COMPUTER	0- 1	5/8	+ 1/8	+22.2
N	U.S. LEASING	5- 24	11 1/4	- 3/8	-3.2
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 2	3/4	0	0.0
A	APPLIED DATA RES.	1- 3	1 3/4	+ 1/8	+7.6
N	AUTOMATIC DATA PROC	21- 57	40 1/4	+4 5/8	+10.6
O	BRANDON APPLIED SYST	1- 1	1/4	0	0.0
O	CENTRAL DATA SYSTEMS	4- 6	3 1/4	+ 1/4	+8.3
O	COMPUTER DIMENSIONS	1- 3	2 1/8	+ 1/8	+6.2
O	COMP ELECTION SYSTMS	3- 4	4 1/8	+ 3/8	+10.0
O	COMPUTER HORIZONS	1- 5	3/4	0	0.0
U	COMPUTER NETWORK	1- 2	1 3/8	+ 1/8	+10.0
N	COMPUTER SCIENCES	2- 4	4	+ 1/4	+6.0
O	COMPUTER TASK GROUP	1- 1	1/2	0	0.0
U	COMPUTER USAGE	2- 4	3 1/4	- 1/8	-3.7
O	COMSHARE	2- 4	3	+ 1/8	+4.3
O	DATATAB	1- 3	1 1/8	0	0.0
A	ELECT COMP PROG	1- 1	1/4	0	0.0
N	ELECTRONIC DATA SYS.	11- 25	15 1/2	+2	+14.8
U	INFORATIONAL INC	1- 2	1/8	0	0.0
O	IPS COMPUTER MARKET.	1- 1	3/8	0	0.0
O	KEANE ASSOCIATES	2- 4	1 3/4	0	0.0
O	KEYDATA CORP	1- 6	3 1/4	+ 5/8	+23.8
O	LOGICON	2- 5	4 1/4	+ 1/2	+13.3
A	MANAGEMENT DATA	1- 2	2	+ 1/4	+14.2
O	NATIONAL CSS INC	5- 37	8	0	0.0
O	NATIONAL COMPUTER CO	1- 1	1/4	0	0.0
A	ON LINE SYSTEMS INC	9- 38	5	- 1/4	-2.7
N	PLANNING RESEARCH	2- 5	4	+ 1/8	+3.2
O	PROGRAMMING & SYS	1- 1	5/8	0	0.0
O	RAPIDATA INC	1- 5	1 7/8	+ 1/4	+15.3
O	SCIENTIFIC COMPUTERS	1- 1	1 1/8	0	0.0
O	SIMPLICITY COMPUTER	1- 1	1/4	0	0.0
O	TYMSHARE INC	6- 12	11 3/4	0	0.0
O	UNITED DATA CENTER	2- 4	2 7/8	0	0.0
A	UPS SYSTEMS	2- 4	3 1/8	+ 5/8	+25.0
N	WYLY CORP	1- 5	3 3/4	+ 1/2	+15.3
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	3- 11	6 7/8	- 5/8	-8.3
O	ADVANCED MEMORY SYS	1- 7	3 3/4	+ 1/4	+7.1
N	AMPEX CORP	2- 8	5	+ 3/8	+8.1
O	ANDERSON JACOBSON	1- 4	2	+ 1/4	+14.2
O	BEEHIVE MEDICAL ELEC	1- 7	2 3/8	+ 1/8	+5.5
A	BOLT,BERANEK & NEW	5- 5	7 1/4	+1 3/8	+23.4
N	BUNKER-RAMO	3- 8	6 5/8	- 1/8	-1.8
A	CALCOMP	4- 11	6 1/8	- 5/8	-9.2
O	CAMBRIDGE MEMORIES	3- 14	3 7/8	- 1/8	-3.1
N	CENTRONICS DATA CORP	7- 23	15 1/2	+2 1/8	+15.8
O	CODEX CORP	8- 27	25 1/2	- 1/4	-0.9
O	COGNITRONICS	1- 2	1/2	0	0.0
O	COMPUTER COMMUN.	1- 2	1/2	+ 1/8	+33.3
O	COMPUTER CONSOLES	2- 4	3 1/2	+ 1/2	+16.6
A	COMPUTER EQUIPMENT	1- 2	1 1/2	+ 1/8	+9.0
U	COMPUTER MACHINERY	1- 5	1 5/8	+ 1/8	+8.3
O	COMPUTER TRANSCEIVER	1- 2	1 1/8	0	0.0
O	COMTEN	1- 5	3 1/4	+ 1/4	+8.0
N	CONRAC CORP	10- 22	18 3/4	+1 5/8	+9.4
U	DATA ACCESS SYSTEMS	2- 3	1 1/8	0	0.0
O	DATA 100	4- 13	11 1/4	+ 7/8	+8.4
A	DATA PRODUCTS CORP	2- 5	4	+ 1/8	+3.2
O	DATA TECHNOLOGY	1- 4	1 7/8	0	0.0
O	DATUM INC	1- 4	1 1/4	0	0.0
O	DECISION DATA COMPUT	3- 13	4 3/4	-1	-17.3
U	DELTA DATA SYSTEMS	1- 2	3/8	- 1/8	-25.0
O	DIVAN CONTROLS	1- 2	3/4	+ 1/8	+20.0
N	ELECTRONIC M & M	1- 4	2 1/8	+ 1/8	+6.2
O	FABRI-TEK	1- 3	1 1/8	+ 1/4	+28.5
O	GENERAL COMPUTER SYS	1- 4	1 1/2	+ 1/2	+50.0
N	HAZELTINE CORP	2- 7	3 7/8	+ 3/8	+10.7
N	HARRIS CORP	13- 34	20 3/8	0	0.0
A	INCOTERM CORP	1- 6	3	+ 1/8	+4.3
O	INFOREX INC	1- 5	4 1/8	+1 1/8	+37.5
U	INFORMATION INTL INC	6- 14	11 1/4	0	0.0
P	LUNDY ELECTRONICS	3- 3	2 7/8	0	0.0
O	MANAGEMENT ASSIST	1- 1	1/2	+ 1/8	+33.3
A	MILGO ELECTRONICS	6- 18	12 1/2	+1 1/8	+9.8
N	MOHAWK DATA SCI	1- 4	2 1/4	+ 1/4	+12.5
U	ODEC COMPUTER SYST.	1- 3	3/4	0	0.0
O	OPTICAL SCANNING	2- 6	2	0	0.0
U	PERTEC CORP	1- 6	4 5/8	+ 5/8	+15.6
A	POTTER INSTRUMENT	1- 5	1 3/4	0	0.0
O	PRECISION INST.	1- 3	1	0	0.0
O	QUANTOR CORP	2- 5	4 1/2	+ 1/4	+5.8
O	RECOGNITION EQUIP	2- 5	3 3/4	0	0.0
N	SANDERS ASSOCIATES	2- 8	5 1/2	+ 5/8	+12.8
O	SCAN DATA	1- 2	1	0	0.0
U	STORAGE TECHNOLOGY	6- 15	9 1/2	+ 3/8	+4.1
U	SYCOR INC	4- 13	7 1/4	0	0.0
O	TALLY CORP.	1- 4	2	+ 1/2	+33.3
O	TEC INC	1- 7	2 1/2	- 3/4	-23.0
N	TEKTRONIX INC	18- 48	29 1/2	-1 1/4	-4.0
N	TELEX	1- 4	2 1/4	+ 1/4	+12.5
O	WANGCO INC	3- 13	3 3/4	0	0.0
O	WILTEK INC	1- 8	2 1/2	0	0.0
	SUPPLIES & ACCESSORIES				
O	BALTIMORE BUS FORMS	4- 6	5	0	0.0
A	BARRY WRIGHT	4- 7	6 3/8	+ 5/8	+10.8
O	CYBERMATICS INC	1- 2	5/8	0	0.0
A	DATA DOCUMENTS	23- 56	40 1/8	+2 1/8	+5.5
O	DUPLEX PRODUCTS INC	6- 22	20 1/2	+ 3/8	+1.8
N	ENNIS BUS. FORMS	4- 7	6 3/8	+ 3/8	+6.2
U	GRAHAM MAGNETICS	5- 11	7 1/2	0	0.0
O	GRAPHIC CONTROLS	6- 14	13 1/2	+ 1/4	+1.8
N	3M COMPANY	43- 79	53 7/8	+ 3/4	+1.4
O	MOORE CORP LTD	33- 57	46 1/2	-1 1/2	-3.1
N	NASHUA CORP	15- 45	18 1/8	+2 5/8	+16.9
O	REYNOLDS & REYNOLDS	6- 35	17 1/2	+3	+20.6
U	STANDARD REGISTER	10- 17	15 1/4	-1	-6.1
O	TAB PRODUCTS CO	4- 11	6	0	0.0
N	UARCO	13- 23	19 1/8	- 5/8	-3.1
U	VANIER GRAPHICS CORP	3- 4	4	0	0.0
A	WABASH MAGNETICS	3- 7	4 1/8	0	0.0
N	WALLACE BUS FORMS	14- 24	20 1/8	+ 3/8	+1.9

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

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370/145	256K	2048K	$25,970	$12,000	$13,970

*Price including maintenance and overtime charges for a typical 600 hour month.
**Typical price including maintenance on a 5 year lease plan. (No charge for overtime).

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